The DENTAL DIGEST

December
1933

PROPERTY OF
DENTAL LIBRARY
UNIVERSITY OF MICHIGAN
DON'T MUTILATE OR
REMOVE

Only GOLD *provides lasting economy*

ECONOMIC conditions, affecting the price of gold during the past several months, have afforded the many gold substitute alloys an *apparent* greater economy appeal. In considering the economy of gold substitutes as compared with gold, however, more than the selling price of the alloy must be reckoned with.

The melting point of stainless steel and similar alloys is too high to make casting feasible. This class of gold substitutes do not lend themselves readily to use in the individual laboratory. Their comparatively low price is more than offset by the inconvenience involved and by the time required to finish and assemble cases.

The physical properties of copper-nickel-chromium and similar substitute alloys are not easily controlled so as to provide the most desirable practical results. The fusion points of this class of alloys are so high as to necessitate special casting equipment at prohibitive cost to the dentist or individual laboratory.

Silver-tin base alloys—alloys similar to those used in making amalgam fillings—because of their brittleness when cast, do not meet the requirements for exacting inlay work.

Brittania metal and like alloys, which are sold under trade names, involve serious difficulties. Because of their low melting points, accustomed technics and materials will not provide castings of true dimensions. Due to their lack of hardness they do not stand up well in castings having marginal bevels.

Base metal alloys have in some instances duplicated the physical properties of casting golds fairly well, but they are not sufficiently resistant to corrosion. And because this class of substitute is more difficult to work than gold, the initial price advantage is more than offset by the additional time required to construct a case.

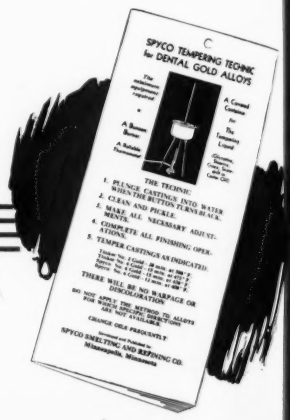
The price advantage of the alloy you use can only be determined in terms of successful performance of the finished case and in lasting patient satisfaction. Careful consideration of all the factors involved determines that the ultimate economy of gold provided by its service, permanence and workability is not to be found in any substitute material.

Your most economical and practical solution to the present situation is to use gold alloys which have the physical characteristics necessary to insure workability and permanent satisfaction, and at the same time provide insurance against corrosion.

Spyco No. 5 is a casting gold for general use that meets every requirement at moderate cost. Spyco No. 5 is economical because of its workability, permanence and freedom from corrosion.

SPYCO
SMELTING & REFINING
COMPANY

Minneapolis, Minnesota



Are you familiar with the Spyco Simplified Tempering Technic? The coupon on page 488 will bring a copy of the Spyco Tempering Booklet.

The DENTAL DIGEST

VOLUME 39 — *December, 1933* — NUMBER 12

EDWARD J. RYAN, B. S., D. D. S., Editor

ETHEL H. DAVIS, A. B., Assistant Editor

An Oral Hygiene Publication. Published monthly on the fifteenth by Dental Digest, Inc.

Entered as second class matter at the Postoffice at Ashland, Ohio, under the Act of Congress, March 3, 1879.

PUBLICATION OFFICES: 636 Orange St., Ashland, Ohio.

EXECUTIVE OFFICES: 1005 Liberty Ave., Pittsburgh, Pa.

Merwin B. Massol, Publisher; Lynn Allen Smith, Treasurer; Associates: J. J. Downes, J. W. Kaufmann; W. Earle Craig, D.D.S.; R. C. Ketterer, Publication Manager.

Subscriptions should be sent to the Publication Offices at 636 Orange St., Ashland, Ohio or to the Executive Offices, 1005 Liberty Ave., Pittsburgh, Pa.

Manuscripts and correspondence regarding editorial matters should be addressed to the editor at 708 Church Street, Evanston, Ill.

Subscription rates, including postage:

$2 per year in the United States, Alaska, Cuba, Guam, Hawaiian Islands, Mexico, Philippines, Porto Rico. To Canada, Great Britain and Continent, $2.75; Australia, $4.25. All other countries, $2.75. Single copies, 25c.

DISTRICT OFFICES:

Chicago: Peoples Gas Bldg.; W. B. Conant, Western Manager.

New York: 18 East 48th St.; Stuart M. Stanley, Eastern Manager.

St. Louis: Syndicate Trust Bldg.; A. D. McKinney, Southern Manager.

San Francisco: 155 Montgomery St., Roger A. Johnstone, Pacific Coast Manager.

Los Angeles: 315 West 9th St.

Copyright, 1933
by Dental Digest, Inc.

A NEW METHOD AND INSTRUMENTATION FOR THE REMOVAL OF IMPACTED TEETH

DONALD J. McDANIEL, D.D.S.
Chicago

THE subject of impacted teeth always has been and perhaps always will be one of intense interest to the profession. Before the introduction of the new method and instrumentation for the removal of impacted teeth described here, there were only three methods: (1) the chisel and mallet; (2) the surgical drills, and (3) the hand pressure cutting instruments, commonly known as Doctor George Winter's method or technique. In dealing with the technique for the removal of impacted teeth I wish to try to present an entirely new and a more definite mental picture of the subject of impacted teeth than has been presented heretofore.

TECHNIQUE

The theory and basis of my method are founded on the histo-anatomic relationship of the crown (enamel) of the impacted tooth to the peculiar bony formation around it. There is always an encapsulated space around the crown of an impacted or partly impacted tooth. *This space is the basis of attack in the new technique* presented here. The ossisectors designed by me take advantage of this space.

After the initial incision and deflection of the gum tissue over the impacted tooth, an ossisector is wedged into the space or encapsulation between the crown of the impacted tooth and the bone. A semi-rotating motion causes the convex surface, or the back of the ossisector, to roll or rotate against the crown of the impacted tooth. This movement forces the blade of the ossisector farther into the encapsulated space and, as the semi-turning motion is repeated, the blade of the ossisector *cores out* and removes the *soft bony structure underneath the hard cortical plate.*

The hard outside or top layer of bone, known as the cortical plate, is dense and difficult to penetrate from the exterior. It is this fact that has made the removal of impacted teeth so difficult heretofore. In the method described here, the hard cortical plate is *undermined,* and when this has been done, the impacted tooth is easily removed. Only enough of the hard cortical plate is removed to permit the tooth to be extracted or elevated.

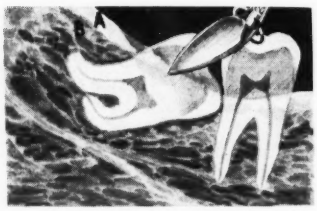


Fig. 1

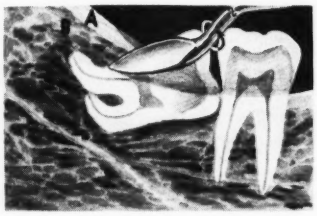


Fig. 2

Fig. 3

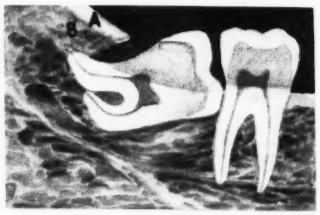


Fig. 4

Fig. 5

INSTRUMENTATION*

Instrumentation for the Horizontal Type—Fig. 1 shows a lower right horizontal impaction. The soft tissue flap is made and deflected in the usual manner. Ossisector number 2 is used to remove the bony structure for this type of impaction. The point of entry depends on the depth of the impaction. If part of the crown is visible the point of the ossisector should be inserted into the encapsulated area at or near the mesio-buccal aspect of the crown, as indicated in Fig. 1.

Fig. 2 shows the osseous structure cored out of the encapsulated area on the buccal surface *down to the middle of the bell shape of the crown.* Care should be taken to remove the osseous structure to this point, so that an elevator may be properly applied on the buccal surface. Any remaining osseous structure above the widest portion of the crown will act as a physical lock and will not permit the proper application of an elevator.

Fig. 3 shows the overlapping osseous structure being removed from the top or distal of the horizontal type. Fig. 4 shows the encapsulated area cored out on the buccal and the distal surfaces of the impacted tooth. Should the thin osseous plate on the lingual surface of the impacted tooth obstruct the removal of the tooth at this time, then the edge of the blade should be reversed and wedged between the lingual plate and the crown. The thin lingual plate is sprung toward the tongue sufficiently to permit the bell shape of the crown to pass while the tooth is being elevated.

If the impacted tooth is completely covered with osseous structure, as in Fig. 5, then the point of entry with the ossisector may be just distal to the second molar. Figs. 5, 6, and 7 show the consecutive steps of this type of operation.

When an elevator is applied to this or any other type, the operator should be careful to keep in mind the shape and direction of the roots and elevate slowly. The overcoming or the

*A in the accompanying illustrations represents the dense cortical plate of bone; B represents the soft bony structure below the dense cortical plate.

removing of definite physical locks around an impacted tooth should be accomplished before trying to remove the tooth.

Instrumentation for the Vertical Impaction—Fig. 8 shows a lower left vertical impacted third molar. The gum flap is made and deflected, if necessary. This will depend on the depth of the impaction.

Ossisectors 1 and 3 are used to core out the encapsulated area for this type. Ossisector 1 is employed to remove the overlapping bony structure on the buccal, from the mesio-buccal aspect to the disto-buccal angle of the impacted tooth (Fig. 8).

Sufficient osseous structure should be removed on the buccal surface to permit the application of an elevator at or near the bifurcation of the roots, or below the bell shape of the crown.

In Fig. 9 ossisector 3 is inserted into the encapsulated area at the disto-buccal angle (where ossisector 1 left off), and *with a back and forth movement of the handle* (the handle should *not* be rotated) the osseous structure on the distal surface of this type of impaction is removed as indicated in Fig. 10.

After the encapsulated area has been cored out on the buccal and distal surfaces, the tooth is then ready to be removed with an elevator. An elevator is applied at or near the bifurcation of the roots or below the bell shape of the crown to remove the tooth (Fig. 10).

Instrumentation for the Disto-Angular Type—Fig. 11 shows a lower left disto-angular impaction. The instrumentation in this case is the same as for the vertical type. The point of entry for the ossisector in the disto-angular impactions sometimes varies. The variation depends on the depth of the impaction and the deflection of the tooth. The point of entry is usually disto-lingual or disto-buccal. More cutting is required on the *distal surface* of an impaction of this type than is usually necessary for a vertical impaction. One should keep in mind the distal inclination of the tooth and the near approach to the inferior dental artery and nerve.

Ossisectors 1 or 3 in many cases may be placed on the occlusal surface and wedged between the crown and the osseous structure overlapping the occlusal surface. A rotating movement of the ossisectors, when thus applied, will cut away the overlapping osseous structure, as indicated in Figs. 11 and 12.

Ossisector 1 is used to core out and enlarge the encapsulated area on the buccal, from the mesio-buccal to the disto-buccal angle of the impacted tooth. Ossisector 3 is then applied at the disto-buccal angle (where ossi-

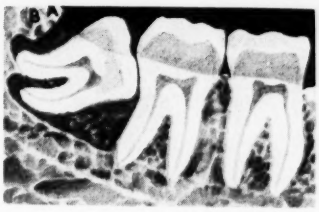


Fig. 6

Fig. 7

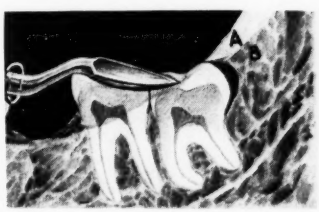


Fig. 8

Fig. 9

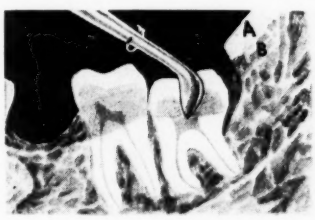


Fig. 10

Fig. 11

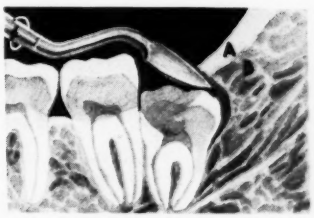


Fig. 12

Fig. 13

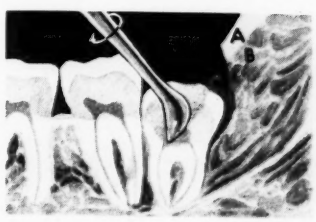


Fig. 14

Fig. 15

Fig. 16

sector 1 left off) and *with a back and forth movement of the handle, not a rotating of the handle,* the osseous structure on the distal surface is removed in the same manner as for a vertical impaction (Fig. 13).

Figs. 14, 15, and 16 show the elevator technique for the disto-angular type of impaction. The arrow in Fig. 16 indicates the cut in the osseous structure on the buccal surface for the application of an elevator at that point.

Instrumentation for the Impacted Upper Cuspid—Fig. 17 shows an upper left impacted cuspid lingually deflected. This type must be removed from the inside through the vault of the mouth.

A typical "L" gum flap should be made over the impacted tooth. The incision for this flap should be made shallow at first; then with a blunt instrument the flap should be resected and deflected toward the vault of the mouth to give proper access for the operation. The operator should keep in mind the close approach to the naso-palatine artery and nerve while making and deflecting the soft tissue flap.

Ossisectors 1 and 2 are used to remove the osseous structure for this type of impaction (Figs. 17 and 18). The point of entry with the ossisector is usually the mesial surface of the encapsulation. The arrow in Fig. 19

55 East Washington Street.

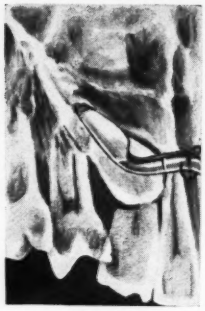


Fig. 17

Fig. 18

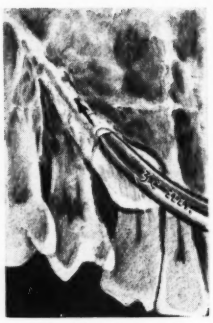


Fig. 19

indicates that part of the crown and root surface to be followed with the ossisectors. By following along the mesial surface of the impacted tooth, a reasonable distance from the other teeth is maintained, thereby protecting them during the operation.

An elevator may be used conveniently in conjunction with the ossisectors in removing the osseous structure. (S. S. White, number 3 C, or a modification of that type.) The elevator is used to spring the bony structure away from the crown and root, after which, the ossisector may be more effectively applied (Fig. 19).

Before the operator attempts to remove the tooth with an elevator he should be sure to see that all overlapping osseous structure around the crown has been properly removed. An elevator may then be applied gently to dislodge the tooth sufficiently to permit the application of forceps to complete the removal of the tooth.

Advantages

This new method and instrumentation have many distinct advantages: (1) The general practitioner can master and execute this method easily; (2) a local anesthetic may be used for all types of impactions; (3) safety in control of instruments; each cut or turn of the ossisector enlarges the point of access; (4) the operator can see the field of operation at all times; (5) the ease by which the bone is removed; (6) the use of little pressure when cutting away the bony structure; (7) less cutting; (8) ease of operation on the patient with practically no shock to the nervous system; (9) less trauma; (10) a more rapid recovery, and (11) ease and speed with which the operator may remove impacted teeth.

ABOUT OUR CONTRIBUTORS

Donald J. McDaniel received his D.D.S. in 1923 from Northwestern University Dental School, and in 1928 and again in 1930 attended Doctor George Winter's course in advanced exodontia at Washington University Dental School, St. Louis. Doctor McDaniel's practice is limited to extraction, minor oral surgery, and radiodontia.

Ray Carlton Brumfield holds the B.S. degree in Civil Engineering from the University of Purdue (1912). Mr. Brumfield is the author of "The Solution of Statically Indeterminate Structures by Transmission Coefficients," published by Cooper Union, and of several magazine articles. Mr. Brumfield is a member of the American Society for Testing Materials, The American Society for the Promotion of Engineering Education, and has had several years of teaching experience. At present Mr. Brumfield holds the position of assistant professor of civil engineering, Cooper Union, New York.

Arthur S. Litten received his D.D.S. in 1904 from the Philadelphia Dental College which is now Temple University, Philadelphia. Doctor Litten is a member of the A. D. A., Pennsylvania Dental Society, and the First District Dental Society. Doctor Litten has a general practice with a particular interest in orthodontia.

Charles Louis Meistroff received his D.D.S. in June, 1931, from the Medical College of Virginia, School of Dentistry, Richmond, Virginia. Doctor Meistroff has previously contributed to the dental literature. He is a member of the American Society of Stomatologists, Alpha Omega, and Alumni Association of the New York Post-Graduate Medical School and Hospital where he served on the house dental staff for one year and is now assistant in charge of the dental x-ray clinic; is engaged in research in the pediatric clinic on chorea in its relation to dental focal infection, and is instructor in basic courses in the post-graduate seminar in Radiology (Columbia University). Doctor Meistroff is particularly interested in roentgenologic, surgical, and pathologic phases of dentistry.

Carl J. Grove is engaged in the general practice of dentistry. He took his Ph.G. in 1896 from the University of Valparaiso, Indiana; his D.D.S. in 1898 from the Chicago College of Dental Surgery; an L.L.B. in 1911 from the Lincoln-Jefferson University, Hammond, Indiana; in 1922, he became an F.A.C.D. Doctor Grove is a member of the A. D. A.; St. Paul District Dental Society; Minnesota State Dental Association; International Association of Dental Research; Omicron Kappa Upsilon, and Delta Sigma Delta.

HEAT TREATMENT OF DENTAL GOLD ALLOYS

R. C. BRUMFIELD, B.S. in C.E.
Freeport, New York

BROADLY speaking, the heat treatment of dental golds may be defined as the heat handling which the gold receives before it goes into service in the mouth. From this definition it is obvious that the dentist in fabricating his structure is heat treating his golds whether he intends to or not. This is true because few dental structures can be completely fabricated preparatory to service in the mouth without the application of heat, in such operations as soldering, annealing, casting, shaping, and pickling. If there are good effects to be produced by heat treating the laws of chance decree that the dentist will occasionally produce them by such uncontrolled heat-handling. No marked effects are produced in the average case. The same laws also decree failures of annoying frequency. If heat treatment is defined from a more objective standpoint, however, it is usually thought of as a succession of heat processes to which it is necessary to subject the gold in order to impart to it certain desired physical characteristics. Such characteristics may be hardness, strength, softness, ductility. Hardness and strength are qualities ordinarily opposed to softness and ductility. It is true, as may be inferred from this fact, that different heat operations are necessary to produce each pair of characteristics. It may be well to state roughly what happens when heat is applied to a gold alloy, in order to be able to visualize the operations necessary to the proper heat treatment for desired qualities.

The changes that take place within a gold alloy when heat is applied to it may best be illustrated by a familiar example. The layman is well acquainted with the fact that when he puts sugar into his morning coffee the sugar dissolves so that it is no longer visible to the naked eye in its familiar granular form. Even if the coffee were passed through filter paper, the sugar would not be separated out. If it is imagined, however, that the sugar remains dissolved only at the temperatures near the boiling point (212° F.), and that at some lower temperature (say, 160° F.) it separates out of the coffee into its usual granules, it is evident that coffee would be, for beverage purposes, an entirely different liquid than it is. In fact, it is highly probable that if the coffee were cooled to low enough temperatures, the sugar would so separate itself.

That which was imagined would happen in the case of the sugar (that is, solution at high temperatures and separation at lower temperatures) is exactly what happens to certain ingredients in gold alloys. At high temperatures, these ingredients go into solution in the alloy, and at low temperatures, they separate out. When these ingredients are in solution, the alloy becomes soft and ductile. When they separate out, it becomes hard and brittle. When only partly in solution, the alloy has intermediate properties. Just what the ingredients are which pass in and out of solution with a change of temperature is not important to the present discussion. It will suffice to say that a compound of gold and copper is probably the most important of them. Others of less importance are compounds of platinum, and of zinc.

In order to visualize the facts that have just been stated with regard to gold alloys, it is necessary for the reader to accept the idea that it is entirely possible for these ingredients to pass in and out of solution in the alloy, even though the alloy is never really liquefied or molten. There are only four characteristics to the process of the passing of these ingredients of the alloy in and out of solution, which are important to the present discussion and which should be remembered:

1. The change of form (dissolved or separated) of the ingredient will not begin until the alloy has reached the proper critical temperature.
2. The change is not instantaneous, but a lapse of time is essential to its completion.
3. A certain degree of plasticity in the metal, induced by elevated temperatures, is ordinarly essential to the change.
4. Since a lapse of time and some plasticity are essential to the change, sufficient rigidity may be imparted to the metal by quick cooling, to prevent a complete change of form, even though the final temperature is below that at which the change normally takes place.

With these four characteristics of the effects of heat on gold alloys in mind, one may proceed to the discussion of the definite heat processes necessary in order to produce desired characteristics in the alloy.

Heat Treating Processes Applied to Gold Alloys: Purposes Served

There are two general heat treating processes that are ordinarily employed in connection with gold alloys. These two processes are radically different, and serve opposing purposes. They are (1) the process for softening the gold alloy, and (2) the process for hardening and strengthening the alloy. The details of carrying out these processes may vary with individuals, but the thing accomplished is the same in all cases.

The softening heat treatment of dental alloys has a primary purpose and, at least, two secondary ones. The primary purpose served by the softening heat treatment is the production of a low strength and high ductility in the alloy. The dentist, in the manipulation of the metal incidental to the shaping of his structure, desires a low strength in order that the metal may shape easily. He requires a high ductility in order that the severe over-strains produced in the metal during the necessary shaping processes may not break it. The softening heat treatment of the alloy also serves the secondary purpose of removing from the metal the strains which were put into it in its manufacture and which are frequently left in it as marketed. This is accomplished through plasticity imparted to the metal at the elevated temperatures. The second important secondary purpose served by this heat treatment is that of putting the metal in a known condition as a preliminary to the subsequent process for the hardening heat treatment. This will be more fully discussed later.

The softening heat treatment ordinarily is, and should be, applied to the gold before any manipulation of it is attempted. This statement applies to wrought golds as purchased and to cast gold structures immediately after casting. If excessive manipulation of the metal is necessary in the shaping, more than one softening heat treatment may be neces-

sary before the structure is complete. Any softening heat treatment subsequent to the first one serves the secondary purpose of relieving the strains put into the metal by the shaping manipulations, such as bending and twisting with pliers.

The hardening heat treatment of a gold alloy is the one given to the metal when the structure is complete and ready to go into service in the mouth. As stated before, the purpose of the hardening heat treatment is opposite to that of the softening heat treatment. For shaping and fabrication, little strength was required of the metal; but much ductility was necessary to withstand the punishment to which it was subjected. On the other hand, for service in the mouth, one can get along with much less ductility but require as much strength as possible, in order that the structure may hold its shape and in order that it may accomplish the purposes required of it. Such purposes might be keeping the denture in line in the case of a clasp, or carrying occlusal loads in the case of a bridge. A certain minimum of ductility is also required to take care of unforeseen conditions which may arise if the structure is misused in service. Should the patient misuse his denture, either consciously or unconsciously, it is preferable for the denture to be bent rather than broken.

Enough ductility must be left in the metal by the hardening heat treatment to provide for a reasonable amount of such unforeseen conditions. The purpose of the hardening heat treatment is, then, to remove the effects of the softening heat treatment which are no longer desired for service purposes, and to put in their place as much hardness and strength as is consistent with a certain minimum of ductility essential to the uncertainties of service conditions to which the structure is to be subjected.

Methods of Carrying Out the Two Heat Treating Processes

Softening Heat Treatment—The method for giving a softening heat treatment to a gold alloy is almost universally approved. The process consists of heating the alloy uniformly to the necessary critical temperature; holding of the alloy at this temperature for a time sufficient for the temperature to become uniform throughout the alloy and for the necessary solution processes to take place; and cooling as quickly as possible. Specifically, the process may be listed with definite figures in three steps as follows:

1. Heat the alloy in a reasonably short period of time to 1300° F.

2. Hold at this temperature for from three to five minutes in order that temperatures in various parts of the structure may be allowed to equalize, and in order to give time for the previously discussed transformations to take place.

3. Cool as quickly as possible, by plunging into cold water, oil, alcohol, or any other suitable cooling medium.

In the first step listed, the heating process may be as reasonably rapid as is consistent with the maintenance of a fairly equal distribution of temperature in the metal. Heating in an open flame is not an ideal method, however, since owing to the great spread between the 1300° F. temperature desired and the temperature in the heart of the open flame, parts of the structure are apt to become spot-hot with harmful consequences, which are discussed later under the heading, "Important Don'ts in Heat Handling." Even if it is necessary to use an open flame for heating, it is desirable that the structure be protected from direct contact with the flame by some suitable container.

The temperature (1300° F.) to which the metal is heated is, of course, arbitrarily chosen. As previously explained, it is necessary to heat the alloy to that minimum critical temperature at which the transformable ingredients affecting hardness go into solid solution. It would be unreasonable to assert that this is 1300° F. for all alloys. It is probable that this critical temperature varies somewhat with each alloy, and even with the different transformable ingredients in a single alloy. If then, one wished to heat to an ideal temperature, this temperature would probably vary with the alloy used, and the procedure would involve a multiplicity of data on the available alloys, together with complicated apparatus for making use of it. The arbitrarily chosen common temperature of 1300° F. on the other hand, has been found high enough in the case of most commercial alloys, to put the essential ingredients into solution as required, and still not sufficiently high to produce the harmful effects of overheating, which are discussed later. It seems probable, however, that a somewhat higher quenching temperature would be more satisfactory for some of the alloys with a high platinum metals content.

It will be evident from this that the exact attainment of this temperature is not essential. If the temperature is missed 30° or 40° F. in either direction, the result will, nevertheless, usually be satisfactory. An operator, however, cannot judge elevated temperatures as closely as the margins listed would demand, and instruments or some equipment for insuring the proper temperature are desirable.

The holding of the metal constant at this temperature for a brief period after the temperature is attained permits the necessary time for the transformation of the ingredients in the alloy, and for uniform penetration of the temperature throughout the structure being heat treated.

As previously stated, the purpose of quick cooling is to produce enough rigidity in the metal to prevent transformation before time is permitted for the transformation to take place. The quickest possible cooling is, therefore, desirable. This means that the metal should be transferred from the furnace to the cooling bath in the shortest possible time. The cooling bath should be at as low a temperature as is possible, and the cooling medium used for the bath should extract heat from the metal as rapidly as possible. Three mediums are commonly used for quenching. These are water, alcohol and oil. These three cooling mediums extract heat at rates diminishing in the order named. Water quenching, therefore, produces a slightly softer alloy than quenching with either of the other two mediums. Ice water as a quenching medium should produce a softer metal than water at room temperature. The differences in hardness as produced by these mediums, while measurable, are not ordinarily great, and there are other factors to be weighed. For instance, alcohol as a cooling medium does not discolor the metal as badly as do water and oil. Therefore, for ordinary purposes, either one produces satisfactory results from the standpoint of quick cooling.

Hardening Heat Treatment—As previously explained, the purposes to be attained by the hardening heat treatment and the method used in carrying it out are opposed to those of the softening heat treatment. In hardening a gold alloy, the result sought is to cause the hardening ingredients which are in the alloy to fall out of solution or precipitate. This is desirable in order that these ingredients may become active as hardeners and strengtheners of the metal. The accomplishment of this purpose requires that the process be started with the soluble ingredients in a known condition. This is necessary since time is needed to effect the required changes. Even though we may be perfectly familiar with the solution cycle, if we are ignorant of the starting point, the proper course of procedure in the treatment is also necessarily unknown. The known condition of the soluble ingredients from which to make a start of the

hardening heat treatment is always that of complete solution or as nearly complete solution as possible. This is the condition of the metal after the softening heat treatment mentioned. The softening heat treatment previously described is, then, the first step in the hardening heat treatment.

The rigidity which has been so quickly imparted to the metal by the softening heat treatment has caused the soluble ingredients to be largely held in solid solution. This state of solution is, however, an unnatural one for these ingredients at normal temperatures; therefore, they only await a relief from a structural rigidity of the metal, to continue their course of separation or precipitation from the state of solution.

This relief from structural rigidity is provided by the second step of the hardening treatment. This consists of a reheating of the metal to a temperature range high enough to permit a continuance of the precipitation of soluble ingredients, and the holding of the metal in this range for a sufficient time to allow as much of the change to take place as is desired from the standpoint of the use to which it is to be put. The most important factor in determining the point at which the process is to be stopped is the loss in ductility that the metal suffers as it increases in hardness and strength. Sufficient ductility must be retained in the metal after the hardening heat treatment to provide a cushion for absorbing unexpected occasional overloads which the structure is apt to receive during its life of active service. If a ductility greater than the minimum needful for service shocks can be retained without sacrificing strength, it is, of course, desirable to do so.

The amount of ductility necessary for service conditions is determined by the practical experience of the dentist. Common practice in dentistry at the present time would say that for wrought wires, the minimum ductility desired in the heat treated structure would be 4 per cent elongation in 2 inches, or about 2.5 per cent in 8 inches. For casting golds of high strength, these requirements would be lowered to about 1 per cent to 1.5 per cent elongation in 2 inches. Most manufacturers specify the ductilities that correspond to the proper heat treatment of their alloys.

The third and last state of the hardening heat treatment is a second and final quenching of the metal to arrest the process of precipitation at the desired point. This quenching is carried out exactly as in the case of the softening heat treatment. The metal is now ready to be put in service, after it has been cleaned and polished.

Specific temperatures and times are necessary for the actual carrying out of the foregoing process on any particular metal. Ideally, temperatures and times would be worked out for each alloy. Practically, this is not feasible, in view of the multiplicity of alloys on the market. The temperatures and times listed are in general use and will give satisfactory results with a great many of the commercial alloys which dentists use today. The hardening heat treatment then may be listed specifically in three steps, as follows:

1. *Quenching Heat Treatment*—Heat to 1300° F., or a little higher for high platinum alloys. Hold at this temperature for three or five minutes, and quench as quickly as possible in cold water or alcohol. One should be careful to move the metal vigorously in the quenching bath while cooling, in order to insure a uniform temperature through the prevention of steam bubbles.

2. A, Reheat the previously quenched alloy to 840° F. at a reasonably rapid rate and allow the alloy to cool in the furnace to a temperature of 480° F. in a period of fifteen minutes.

B (As an alternative to A), Reheat to a previously determined temperature which has been found to be satisfactory for the alloy being treated, and hold at this temperature for a definite time as determined by experiment.

3. At the end of the slow cooling process, quench the alloy in water or alcohol, as the last step in the heat treating process.

The alternative under step 2 requires an explanation. The process described under A of step 2 is by far the most common, and for alloys in general, is probably most satisfactory. This is true since in the slow-cooling from 840° to 480°, the alloy has a much better chance of arriving at the most favorable temperature, or temperatures, for precipitation of its ingredients than it would have in the case of 2, B with holding at a constant temperature. This is true since if there is more than one ingredient affecting the hardening of the alloy (as often occurs) a predetermined constant temperature at which to hold the alloy would favor the precipitation of one of these ingredients more than others. In my experience with heat treating for a given alloy, I have never yet found one that would not respond more markedly to the variable temperature cooling period than to the treatment with holding at a constant temperature for a definite time. It is, also, more difficult to construct a furnace that may be held at a number of different constant temperatures than it is to provide a furnace that will cool between specified temperatures in a definite period of time.

Common Errors in Heat Handling of Dental Gold Alloys

As has been pointed out, many of the difficulties encountered in the use of gold alloys may be obviated by proper heat treatment. Examples of this fact are the removal, through the quenching heat treatment, of the strains due to cold-working the metal either in the manufacturing process or in shaping with the pliers; and the removal of excessive weakness of the metal just before it is to be put into service by the hardening heat treatment. While such proper heat handling of the alloy is a great benefit in overcoming the handicaps which may be introduced in the process of fabricating the dental structure, it is not a cure-all.

Important Don'ts in Heat Handling

1. *Don't Overheat Metal.*—Any of the dental alloys when heated up to a point near the lower limit of the melting range suffer decided grain growth, and, in some cases, incipient melting of some of the lower fusing ingredients in the alloy.

The results of such mistreatments are often evidenced in the microscope by the appearance of small bubbles around the grain boundaries of the metal. Metal that has been so mistreated suffers a decided loss of ductility, and will have an annoying brittleness when put in service. Many examples of gold alloys that have fallen apart in the mouth, leaving no apparent explanation for the breakage, might be traced to this cause. It is easy unintentionally to overheat the metal when the practice is followed of heating the bare wire in an open gas flame.

Some technicians are in the habit of heating their wires in an open flame for quenching purposes, determining the quenching temperature from the tendency of the wire to wilt or droop in the flame. Such softening of the wire is direct evidence of incipient melting. Such technicians are in the habit of deliberately overheating all their wires to their own detriment as well as that of the patient.

Determination of the proper temperature at which to quench the wire cannot, in general, be safely made without some adequate means for measuring temperatures, even though

many operators acquire a high degree of skill in judging temperature.

2. *Don't Quench Metal Unevenly From A High Temperature*—It is important in quenching a piece of metal for softening that the cooling take place as evenly as possible throughout the extent of the metal. An uneven cooling of the structure will usually result in decided warpage which, in turn, indicates unknown permanent stresses within the metal itself. In quenching a piece of metal, the whole piece should be plunged as quickly and as evenly as possible, and shaken vigorously in the cooling bath throughout the cooling process. This is done in order to eliminate as far as possible the formation of steam bubbles on the surface of the metal. These steam bubbles, if allowed to remain undisturbed, tend to protect the metal in spots from contact with the cooling medium and so induce uneven cooling.

3. *Don't Attempt To Work The Metal At Elevated Temperatures Unless Certain That It Will Withstand Hot-Working*—Many users of dental gold (particularly orthodontists) have occasion to shape parts of their structures at red heat. Other users of dental golds are inclined to attempt this, even though no necessity exists for the course of procedure. This is a natural thing to do, in view of the familiarity which the average man has with the fact that ability to hot-work well is a common attribute of steels and iron. Gold alloys, contrary to the cases of iron and steel, ordinarily do not shape well at high temperature. Most gold alloys are extremely weak and brittle at elevated temperatures, particularly at temperatures just below a red heat. In general, this statement is more decidedly true of the gold alloys of little or no platinum content. If it is necessary to work the metal while hot, in the process of constructing the case, the dentist should ascertain from the manufacturer whether the alloy that he is using will withstand hot work satisfactorily. Even alloys that will withstand hot-working satisfactorily, should be worked at a bright red heat and not at temperatures just below a red heat.

4. *Don't Pick Up Hot Gold Alloys With Cold Tongs Or Other Apparatus Of Decidedly Different Temperature Than The Alloy*—The reasons for this caution are obvious. As stated in Item 3, gold alloys are brittle at elevated temperatures just below red heat. The cold tongs extract the heat from the alloy at the point at which they come in contact with it, and not only render the alloy subject to breakage at that point, but induce uneven cooling in it, which was cautioned against in "don't" 2. In heat treating a piece of gold, it is desirable to put it into a container and place the container and all in the furnace, allowing them to reach a uniform desired temperature. The container then may be handled with the cold pliers, but the metal itself should not be so handled.

5. *Don't Drop Or Jar A Case While At Elevated Temperatures*—The reason for this caution is also obvious from "don't" 3. A slight jar or shock to the metal while at elevated temperatures is apt to cause breakage, since the metal is then in its weakest and most brittle state.

6. *Don't Bring Alloy In Contact With Injurious Contaminating Elements In Either Hot Or Cold Condition*—Some of the most important of these elements may be listed as mercury, lead, babbitt metal. Any of these metals readily alloy with the gold and render it so hard and brittle as to be useless for structural purposes. If any of these are necessary around the dental laboratory, great care should be taken that they do not come in contact with the gold alloys.

Advantages Obtained by Proper Methods of Heat Handling

In describing the heat handling processes suitable to dental gold alloys, some of the benefits which are to be expected from such methods have been mentioned. It is proper that these advantages, as well as others not mentioned, should be assembled and emphasized in order that the reader may weigh them against the effort involved in controlled heat treatment. The benefits that accrue to the metal through proper heat treatment are, in general, of two classes, tangible and intangible. The tangible advantages may be described roughly by the statement that they can be detected by the ordinary means of observation at the disposal of the average user of dental alloys. The intangible advantages, on the other hand, are those which, when they accrue to the metal, produce no apparent effect other than to permit it to serve a long period of active structural use in the mouth. They only become apparent by their absence, resulting in failure of the structure with consequent annoyance to both the patient and the dentist.

The tangible benefits that accrue from proper heat handling are three in number:

1. The strength of the metal is decidedly increased. This increase in strength, in extreme cases, may amount to as much as 100 per cent for alloys that react markedly to heat treatment. The statement as to the increase in strength possible to be attained through heat treatment is, of course, based on the results of tensile strength tests of material. It can be shown, however, that these results are completely indicative of the strength of the finished structure as well; that is, if through proper heat treatment, the tensile test piece showed an increase in strength of 70 per cent, one would expect the same metal, when put into a finished structure in a different form (say, in the shape of a clasp) to require about a 70 per cent greater force of a different character to break it than would be required if the metal had not been heat treated. The same comparative statement would hold with regard to the amount of force required to deform the clasp permanently. In other words, if it required, for example, a force of one-half pound to bend the clasp a sufficient amount so that it would not go back to its original position when in the quenched condition, then when heat treated, it should require 70 per cent more force than this, or eighty-five hundredths of a pound, to produce the same effect. From these statements, it is obvious that although heat treating a case is not insurance against breakage, in view of the extremely large forces available through the process of mastication, the chance that a sufficiently large force will come on the structure to damage it permanently is decidedly lessened through the increase in strength imparted by heat treatment.

2. A known ductility is imparted to the metal, which is sufficient for requirements of ordinary structural service. The property of ductility is most familiar to the average dentist when described as that property which permits the metal to be bent and shaped without breakage. It is the possession of this property that provides a cushion through which the metal absorbs the innumerable small shocks and impacts to which the parts of the dental structure are necessarily subjected when actively in service in the ordinary mouth. It is unavoidable that occasionally one of these shocks should be sufficient momentarily to stress the dental structure beyond its elastic strength. It is then that ductility comes into play in absorbing such innumerable overloads.

Dental experience at the present time seems to demand that in wrought metals this required ductility be about 4 per cent elongation when measured in a 2 inch gauge length. For cast metals, the amount required is about 1 per cent in the same gauge length.

Possession of this ductility, also,

permits the structure to be adjusted from time to time without undue danger of breakage. This is particularly important with orthodontic structures and in the case of clasps and bars. The possession of as much ductility as mentioned should permit from one to two right angle bends of the wrought wire, in the round-nosed pliers, without breakage.

A known flexibility is imparted to the metal. In general, the increase in permissible flexibility of a dental structure through heat treatment is almost in proportion to the increased strength noted heretofore. An increased flexibility is important to the dental structure in absorbing shock and impacts in the mouth. If a clasp will permit the structure to move laterally 70 per cent more when heat treated than when not heat treated, the chances of that clasp getting permanently out of alinement are much less than those the clasp would have if it had not been heat treated. The increased flexibility again also helps to cushion shocks and minimize their ultimate effect on the structure.

Among the intangible benefits accruing to ordinary metal through controlled heat treatment, three may be mentioned as the more important:

1. The absence of grain growth in the metal through over-heating with the attendant brittleness which it imparts to the gold. As was previously pointed out, a small piece of dental gold wire may readily be heated in the open gas flame to a point near the lower limit of melting range without the fact being at all apparent to the operator. When heated to these temperatures, the crystalline grains of the structure become decidedly large, and incipient melting of some of the lower fusing elements often takes place at points in the alloy. This condition always leads to brittleness. This brittleness is never apparent to the naked eye and leaves the surface of the metal unchanged in appearance. It can be observed only by examination of a polished section of the metal under a microscope. Its presence will only make itself felt when the structure breaks after having been in service a short time. In most cases, the prevention of resulting annoyance would amply repay the operator for the trouble necessary in proper heat handling of his alloy.

2. The absence of internal stresses in the structure. These internal stresses result from many causes, the most common one being the cold shaping necessitated by using the pliers to form the structure. As a consequence, such stresses are almost always present in the finished dental case. If it is not subjected to the softening heat treatment to remove them, they remain in the structure after it goes into service in the mouth. Their presence is apt to cut down proportionately the chances the structure has of giving satisfactory service in the mouth. When such stresses are present, they are always accompanied by a considerable loss in the ductility of the metal, which, as was previously pointed out, lessens the ability of the structure to withstand shocks and blows.

3. The protection of the structure, at the soldered joints from unknown conditions of service. The great majority of dental structures require one or more joints. The gold solder used is usually of a considerably lower melting point than that of the metal of the structure proper. This solder alloys with the metal at the point of attachment, and changes its characteristics as well as that of the solder by unknown amounts. Such points are apt to be subjected to the overheating mentioned, because of the fact that the alloy has a lower melting point here. It is, therefore, important that the metal be not over-heated at these points, and so subjected to the grain growth resulting from overheating.

The observance of the principles described for proper heat handling of dental golds to produce definite desired results is not difficult. It more than repays itself in the avoidance of the damaging effects of improper heat handling too often resulting from haphazard methods. The definite structural benefits of improved strength, flexibility and shock resistance are, therefore, clear gain to the structure, and commend to the dentist generally the desirability of giving more attention to these matters.

212 Rutland Road.

METALLURGICAL TERMS

1. **STRENGTH OF A STRUCTURE** is that load which the structure will carry. It may be either of two kinds: elastic strength or inelastic strength. The elastic strength is the load of a given character which will permanently distort the structure. The inelastic strength is the load of a given character which will be required to break the structure.
2. **HARDNESS** is the resistance of the metal to penetration by an external object.
3. **DUCTILITY** is the ability of the metal to stretch before breaking.
4. **PERCENTAGE OF ELONGATION** is the percentage by which a given length of the metal increases in length between the conditions of no load and rupture.
5. **HEAT TREATMENT** is that series of heating processes which the metal receives in its fabrication into the dental structure.
6. **SOFTENING HEAT TREATMENT** is that series of controlled heat processes which is given to the metal in order to render it as soft and ductile as possible.
7. **HARDENING HEAT TREATMENT** is that series of controlled heat processes by which the metal is rendered as strong and hard as is consistent with a necessary service ductility.
8. **MELTING RANGE** is that range of temperatures at the lower limit of which the metal starts to melt and at the upper limit of which it is completely molten.
9. **CRYSTALLINE GRAINS** may be roughly defined as the microscopically observable particles of which the metal mass is built.
10. **GRAIN GROWTH** is the term used to refer to the merging, under favorable conditions, of adjacent crystalline grains to form larger ones.
11. **FLEXIBILITY** is the amount of distortion of a given character which may be given to a structure without leaving a permanent effect when the distorting force is removed.

MOUTH RESTS FOR OPERATIVE DENTISTRY

ARTHUR S. LITTEN, D.D.S.
New York

FROM the knowledge gained through inquiry at clinics, it seems strange how few operators make use of mouth rests although practically all have tried them at one time or another, and, therefore, are acquainted with them. Rests are not only of great assistance to the operator by keeping the mouth open at a set position, but also add much to the patient's comfort without forcing him to concentrate on keeping the mouth open and without tiring the muscles of the jaw. For children they are valuable because children seldom concentrate long enough to keep the mouth open as the operator would like to have them do; the psychologic effect is also good in that they feel they are assisting and frequently place the rest themselves and maintain the position ususally as long as is required.

There are many kinds of rests for sale, metal and rubber, both soft or hard, or combined, and wooden. All of them have one or more objections and no doubt have caused many operators to discard the use of rests after a trial or two. The wooden prop is good, but has not enough resiliency and often splits after it is sterilized two or three times. The mouth rest to be described here while not ideal seems to me the best and has the added benefit of being easily made in any size and at a cost of only a few cents each.

Some Uses of Mouth Rests

Jaw or mouth rests are used to advantage in every branch of clinical dentistry except possibly full denture work: (1) In partial denture or bridgework rests are frequently used while preparing abutments or to keep the mouth open and at rest while taking impressions, especially with the attachments in position, regardless of the kind of impression material used; (2) rests are used in most cavity preparations, especially when in the labial or buccal position; (3) in all cementation and the placement of restorations; (4) one can often place a gold foil restoration on favorable surfaces without the use of a rubber dam, either upper or lower jaw, and have the patient completely at ease with the use of a mouth rest.

5. Frequently in prohylactic work a patient will not keep the mouth open. The operator is obliged to say, "Open, please," so often that both patient and operator are soon tired. If a rest is placed in a favorable position, usually on the side opposite to the one being treated, the result will be much more satisfactory.

6. The periodontist who does so-called radical treatment will find mouth rests of assistance.

7. In oral surgery rests have been used a great deal, especially with the use of a general anesthetic, but they are also recommended when giving an injection, especially, a mandibular injection. Rests aid the patient to keep the jaw still, thus helping to prevent a broken needle.

8. When doing a difficult extraction under infiltration or conduction anesthesia on either jaw, but more especially the lower jaw, a rest helps to place both patient and operator at ease, reducing accidents and the not uncommon complaint of straining the jaw at the condylar joint.

The individual operator will find other uses for the mouth rests.

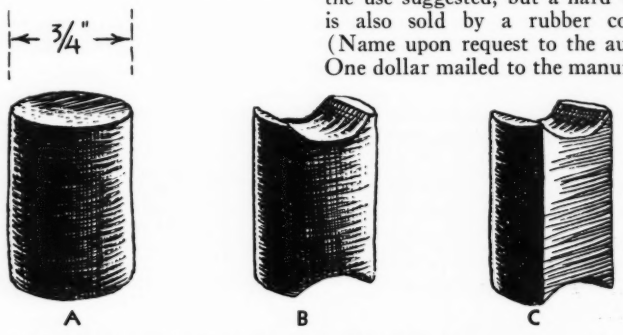
Though some orthodontists tell me they get along without rests, I believe they would find it an advantage if they were more generally used. One child patient said to me recently after just having had a rest in his mouth, that he wished his other dentist (referring to his orthodontist) would use "something like that," meaning the rests.

The rest should be placed in position anteriorly or posteriorly in such a way as to give the proper cheek relaxation. It should not be placed posterior to the first molar if it can be helped. The region of the second bicuspid or first molar of the adult or first molar of the deciduous teeth is the most comfortable position, or any position anterior to that, usually on the opposite side from that on which work is being done.

How to Make Mouth Rests

The material used to make mouth rests is known as cord rubber; it is used commercially for making gaskets. The rubber is round; hence the name. It comes in different sizes of any length. The size preferred is three-fourths inch in diameter (A, in the accompanying illustration). Much of the material is too soft for the use suggested, but a hard variety is also sold by a rubber concern. (Name upon request to the author.) One dollar mailed to the manufacturer will bring about 3 feet which should make approximately three dozen rests, depending, of course, on the sizes made. The sizes used most are three-fourths, seven-eighths and 1⅜ inches in length, though it is well to have a few other slightly varying lengths on hand. After the lengths of rubber desired are cut, a scallop of half round depression is ground on each end, as shown in the drawing (B) with the coarsest carborundum stone. I prefer a stone sold for use on the lathe for trimming alloy models.

Two sides are then ground flat, opposite each other and in line with the scallop, the rest being left about one-half inch thick (C).



A shows a piece of cord rubber three-fourths inch in diameter.

B shows half round depressions as cut on each end with a coarse carborundum stone.

C shows the cylinder trimmed flat so as to have two parallel sides. This reduces the rest to a thickness of about one-half inch.

(*Continued on page* 480)

A SIMPLIFIED TECHNIQUE FOR THE REMOVAL OF APEXES AND RETAINED ROOTS

C. L. MEISTROFF, D.D.S.
New York

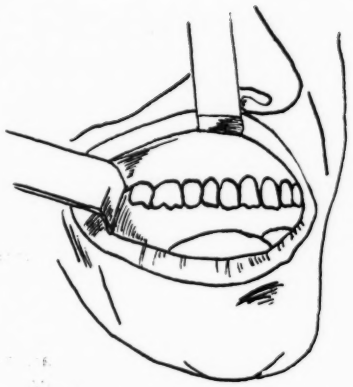


Fig. 1—Upper right second bicuspid is indicated for extraction.

IN SURGERY of the mouth speed and the easiest way to remove an offending organ or to repair an injured part is not the object in this field of procedure, except in emergency. On the contrary, sufficient operating access accompanied by a minimum of surgical trauma are the objectives. The surgeon is so engrossed in reaching his objective that he does not think ahead of himself so that sufficient forethought can be given to postoperative sequelae. Observance of these is of the same importance as in performing the operation.

If serious consequences ensue, such as extreme swelling, pain, or trismus which could have been avoided by proper handling at the time the operation was performed, then the benefit resulting will be overshadowed by a train of undesirable circumstances which were susceptible of being controlled during the operation. Again, scant provision is made for the prosthodontist. Alveolectomy and general bone surgery are done routinely; sometimes, whether indicated or not, with the subsequent result that the case is beset with restoration complications.

Although I do not claim originality for this technique, this particular modification fulfills its objective in minimizing trauma and tissue destruction. In other techniques of the same type it is observed that a large opening is made somewhere in the region of the apex or retained root to allow it to be removed through the window whereas in this variation only sufficient tissue is touched to allow for extra-alveolar leverage into the alveolus; curettage, if necessary, is easily accomplished as in other techniques. Thus, this technique takes into consideration a smaller incision, smaller window, and quicker recovery, and is applicable wherever similar techniques have been used.

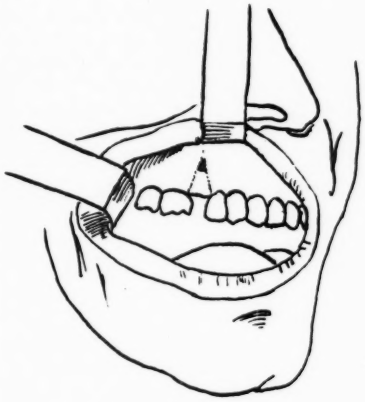


Fig. 2—The tooth has been extracted and the apex remains.

Technique

By way of example, the buccal roots of the upper posteriors and any of the lowers will be discussed: An upper second bicuspid has been removed and the buccal apex remains. The usual procedure in such a case, after apical teasing has failed, is to make a semilunar incision from the muco-buccal fold along the buccal plate to the ridge, flap the tissues back, break down the plate of bone to the apex, exposing it, and elevate it out; then to smooth off the bone and suture. Its disadvantages are the deep depression left on healing and longer time required to heal.

I have tried a procedure on cases such as this which has brought excellent results:

An incision is made at the muco-buccal fold parallel with the occlusal plane and the tissue retracted upward. The depth of the alveolus is measured with a probe which if placed on the outside will give the depth of the apex on the buccal plate. A Crane pick forced through the bone will dislodge the apex. If the plate is too resistant a Schamberg spear-headed bone bur is placed on the buccal plate over the end of the apex, drilled through, and with a Crane pick or a small elevator the apex is forced out. Bone spicules are removed, the bone smoothed off and the tissue sutured. An iodoform gauze drain is loosely placed in the socket and the patient instructed to return in twenty-four hours.

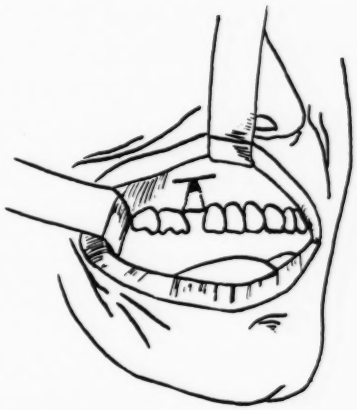


Fig. 3—This step shows the horizontal incision made in relation to the retained apex.

The advantages are self-evident: (1) There is eliminated unnecessary surgical trauma. (2) This means little if any postoperative edema and pain. (3) It also means that the

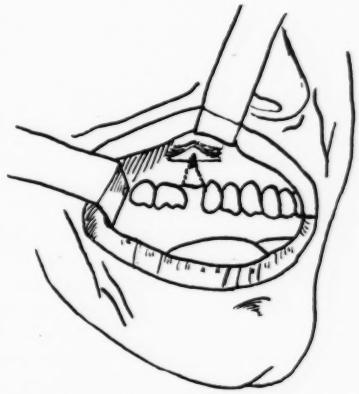


Fig. 4—Upper tissues are retracted and the overlying buccal plate is exposed.

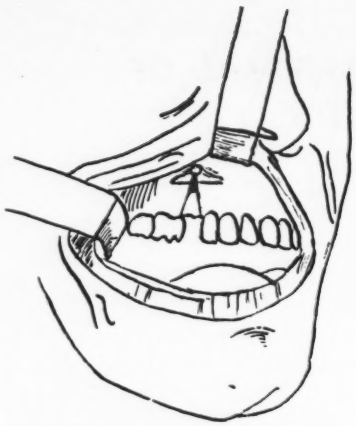


Fig. 5—The hole is burred over the end of the apex.

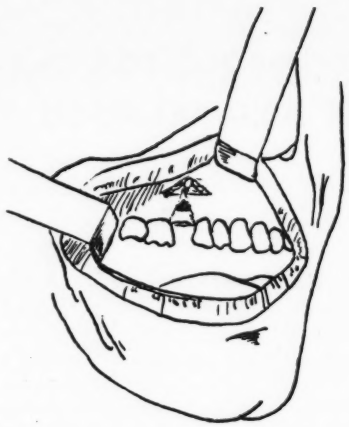


Fig. 6—Apex loosened and dislodged into the alveolus.

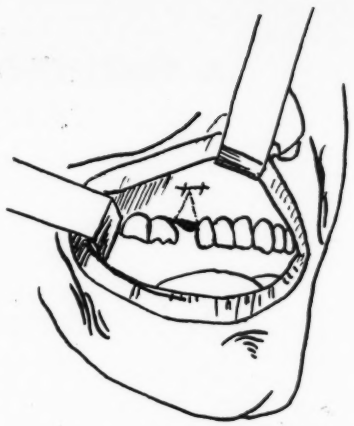


Fig. 7—A clean alveolus treated with an iodoform gauze drain and the incision sutured. Observe the absence of other than necessary surgical tauma. Bone is conserved and there is a lack of soft tissue involvement.

alveolar ridge is left intact and the time for recovery is lessened with the result that the (4) restorative appliance can be put to place sooner.

The iodoform gauze drain is an ideal agent for the prevention of postoperative infection. It (1) stimulates granulation tissue; (2) keeps the clot intact; (3) deodorizes the operative area, and (4) keeps food and oral débris from packing into the wound. The drains are changed every forty-eight hours until the alveolus is well healed and may be easily cleaned by the patient.

Before any surgical procedures are instituted it has been my practice always to have the patient rinse his mouth with a mouth wash or else use peroxide of hydrogen diluted 50 per cent. This removes accumulated débris. It is true that one cannot sterilize the mouth but at least an attempt may be made to have a cleaner field in which to work. This helps to eliminate postoperative infection.

Some operators are greatly averse to the use of burs for bone surgery. They point out that the bone is subject to infection and postoperative sequelae by heating of the tissues (because of friction) and subsequent death of the tissues. This is groundless. Constant contact is not maintained. The bur is held to the bone only for about five to fifteen seconds at a time. It is constantly cooled by the oral fluids and blood. The shock from chisel and mallet procedures is eliminated.

A large Schamberg spear-headed bur used judiciously accomplishes a great deal. Instead of using a chisel or spear-headed elevator to separate retained or hypercemented roots, the bur directed through the bifurcation provides ample space by separating the roots to allow a Crane pick or an elevator to be inserted and the remnants worked out unless the roots are so badly hypercementosed that the removal of the buccal plate is indicated.

In the removal of upper roots that have been broken off at the gingival, or are carious remnants, the practice is to use a long narrow-beaked bayonet forceps. It has been my experience and the observation of others in cases of this kind that the use of a straight gouge-shaped elevator gives better results. Forcing the blade between the alveolus and the roots loosens them sufficiently to allow their removal with the elevator alone or the elevator supplemented by the use of a root forceps. This technique is applicable in all cases of the upper jaw except those complicated with hypercementosis.

22 North Way Avenue, Corona, L. I.

The Crane pick is a valuable instrument in an exodontist's armamentarium. It can be used for creating space between roots. As an elevator for lower molar roots it has distinct advantages. It can be used to force out retained or broken down roots. It can be used as an elevator with either right or left movement. The point can be forced through the alveolar process and to the root with the force applied as to an awl. Carious roots and carious deciduous teeth are easily lifted out.

Sutures

Sutures are preferably made with horse hair which is not conducive to infection and permits the sutures to be easily grasped and removed. The resiliency of these sutures is sufficient to maintain tissue proximation without tightness. Tightness in a suture is undesirable because it causes strangulation of the blood supply and results in a sloughing instead of a union.

In areas in which there is sufficient natural proximity of the tissues owing to their being forced together, by muscular action or elasticity, sutures are contraindicated.

The Annual Index appears in this issue on page 476

ESSENTIALS TO SUCCESSFUL PULP CANAL SURGERY

CARL J. GROVE, Ph.G., D.D.S., F.A.C.D.
St. Paul

THERE are three requisites that must be observed if periapical tissue is to remain free from infection: (1) All of the pulp tissue must be removed whether it is vital or decomposed; (2) the pulp canal must be sealed at the proper apical point; (3) impermeable substances must be employed as a filling material.

Failure to remove all of the pulp tissue will hamper the healing forces of periapical tissue and produce a condition conducive to further disintegration, which may be followed by periapical infection. Owing to the embryonic character of pulp tissue, the essential powers of healing possessed by many other tissues are lacking; therefore, little can be expected in the way of regeneration when large portions of vital pulp remain. That healing of small portions of pulp tissue remaining in the apical region of the canal does sometimes occur is demonstrated in Fig. 1. It may be noted in Fig. 1, A, that the tissue at the apex has been changed from pulp tissue to fibrous tissue. When a large portion of the pulp is left, it disintegrates, and infection follows. It is not a wise procedure, therefore, purposely to allow pulp tissue to remain. A significant condition has developed within the canal; i.e., the deposit of cementum on the inside of the canal at B, Fig. 1. It is apparent that this change is for the purpose of maintaining the health of the tissue in the canal. The cementum was formed to seal the openings of the tubules in this portion of the pulp canal in order to prevent organisms from entering and infecting the protoplasm existing therein. Since the gutta-percha filling terminated in the dentine or just short of the cemental junction, infection of tubules would have been possible; therefore, Nature sealed the openings to prevent this; but where the canal has been filled up to or into the apical cementum, such infection is not possible.

It should be remembered that in filling the pulp canal the tubules should be sealed as well as the foramen and the accessory canals. If this is accomplished, periapical infection will be averted, for bacteria present in the dentine will be confined to the tubules where their escape is made impossible. To seal the tubules as well as the apical openings an impermeable, cohesive, liquid material is employed in conjunction with a cone standardized to the opening of the canal. The results shown in Fig. 1 do not always take place when pulp tissue is left; in fact, it rarely does occur; therefore, pulp tissue should never purposely be left.

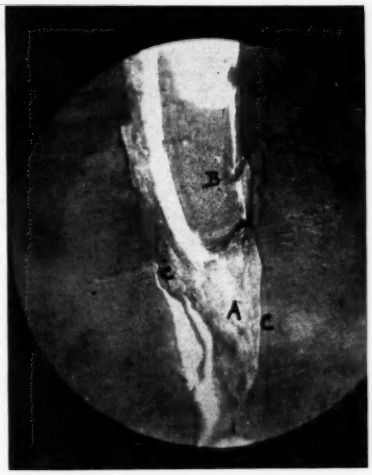


Fig. 1—Original pulp tissue, fibrous at A; B, gutta-percha; C, cementum, sealing the tubules to avert infection of contents. A deposit of cementum would not have occurred in putrescent canals. The section was made five years after the root was filled.

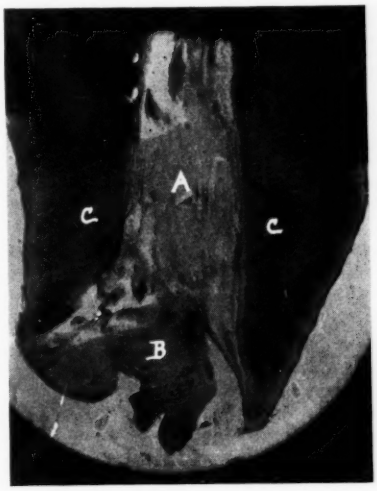


Fig. 2—Root of a young person, having a large foramen. A, pulp tissue; B, periodontal membrane which should be left when pulp is removed; C, dentine. Note divergent foramen to accommodate this tissue.

The investigations of Noyes, Marshall, and others prove that the cementum is impermeable. Some contend that the apical cementum is permeable, but it is possible that such observations may have been due to the presence of multicanals. The fact that a large percentage of roots have multicanals leads me to this conclusion. Elsewhere[1] I have presented a method for disclosing multicanals. In selecting the teeth for this work, I was surprised to find that many of the best specimens obtained appeared to have only one canal before they were prepared, but, as a matter of fact, as many as eight canals were found in some of these roots. It is not possible to determine the presence of multicanals before the tests are undertaken. The permeability of apical cementum or the existence of apical multicanals is not an unfavorable factor in successful pulp canal surgery if a proper technique is employed. The diameter of the canal can be enlarged and extended to a point at which the cone will be surrounded by primary cementum that is impermeable.

Filling Should Terminate in Cementum

The filling should extend to the dentino-cemental junction so as to terminate in the cementum, thus completely enclosing the dentine with an impermeable substance. It is not objectionable to extend the filling even into the apical cementum. The material used, however, must not pass through this structure into the periapical tissue, because the irritation following may result in infection. Canals should be filled to the dentinocemental junction, then, because (1) it makes the escape of bacteria from the tubules impossible; if the cementum is impermeable, the organisms will be confined to the dentine as they cannot pass through the sides of the structure; (2) serum which may escape from the periapical tissue will be prevented from entering the root canal and thus supply nutrition to the bac-

[1] Grove, C. J.: The Boilogy of Multi-Canaliculated Roots, *Dental Cosmos*, 58: 728-733, (July) 1916.

teria present in the tubules. It is quite probable that a large number of periapical infections occur when an open foramen exists.

Unless impermeable materials are employed, filling the canals to the dentino-cemental junction is of no avail, because bacteria would escape through the filling and serum would find its way into the canal from the periapical tissue. Failure to use suitable materials is, I believe, a frequent cause for infection following pulp canal operations.

Root-End Anatomy

In the teeth of young persons the foramen is large and divergent, or corresponds in form to an inverted funnel, illustrated in Fig. 2. The space in the foramen is occupied by periodontal membrane (Fig. 2, B), and not by pulp tissue. In the development of the root end a deposit of dentine is formed in the main portion of the canal, and cementum is formed in the foramen, or in the apical portion of the canal, the membrane gradually being replaced by cementum. When the cone extends to this point, cementum will entirely surround the filling, hermetically sealing the foramen, and thus making the escape of bacteria from the tubules impossible.

If the pulp extended through the foramen, as some authorities maintain, dentine would be formed in this part of the canal instead of cementum. The fact that dentine is not present proves that the pulp does not pass through the foramen. The same condition exists in the accessory canals.

The significance of the anatomic arrangement of these structures is not sufficiently recognized. Successful pulp canal surgery is made possible through the character of and by the anatomic arrangement of this structure. If it were not for the presence of the periodontal membrane in the apical portion of the canal, the formation of cementum would not occur. It is obvious that if pulp tissue were present, dentine would be found in place of cementum, and, owing to the character of dentine, it would be impossible to seal the canal absolutely.

Since the function of the membrane is to form cementum, it is logical to assume that tissue of such a character will be formed, and it is known that closing of the foramina will sometimes occur when all of the pulp is removed, provided the membrane is left intact. This is no longer a theory, but a proved fact, as can be seen in Fig. 3. I do not mean to imply that these results will always follow, but they do frequently occur. The cementum shown in the center of the section in

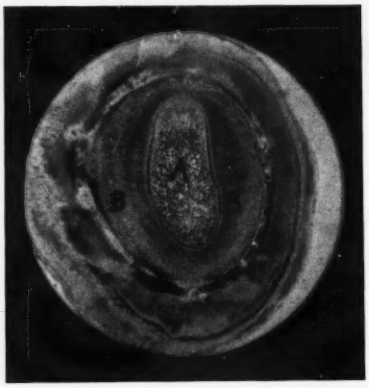


Fig. 3—Cross section of apex at foramen. A, cementum replacement of membrane normally present in foramen; B, dentine. Formation of cementum in foramen is Nature's method of sealing the apical end of canal.

Fig. 3, A, was at one time periodontal membrane; it was converted into cementum, thus closing the entire foramen.

The Value of the Dentino-cemental Junction in Pulp Canal Surgery

Cementum is a specialized tissue. A structure possessing special characteristics has specific functions to perform. Inasmuch as there is good reason to believe that cementum is impervious, it is obvious that one of its functions is to protect the investing tissues from the invasion of bacteria present in the dentine. The dentino-cemental junction is, therefore, of value in pulp canal surgery because it offers an ideal point for the termination of the canal filling. If the filling terminates in the dentine or just short of the dentino-cemental junction, a precarious situation is created, because it makes escape of bacteria to the periapical tissue possible. Periapical infection is invariably due to the escape of organisms from the dentine by way of the canals. If cementum were permeable, infection would frequently occur on the sides of the root also. When the filling fails to reach the junction, a continuous migration of organisms to the apical tissue will occur, making healing impossible (Figs. 4 and 5, A).

It is during the process of root-end development that multicanals are formed, as a result of the deposit of calcic material in the replacement of the tissue in the divergent foramen. The cementum is gradually deposited as the obliteration of the soft tissue occurs. The blood vessels are left intact, calcic materials being developed around them, and openings being left for the supply of nutrition to the pulp tissue.

The direction of the accessory canals is not in a line with the long axis of the root, but they pass through the apical cementum in a diagonal direction until they enter the pulp canal. There the canals group into a bundle as they reach the dentine. The tissue existing in the multicanals, which are formed by cementum, is largely composed of blood vessels. There is periodontal membrane, however, at the foramina, which has an important part in producing and maintaining the state of health of periapical tissue of pulpless teeth. It is only by hermetically sealing the apical openings in the primary cementum that the membrane can be induced to function in bringing about these results. The apical cementum is permeable in a large percentage of teeth owing to multicanals. Some may be of the opinion that sealing of the apex is impossible because of this condition, but this is not the case. When the diameter of the canal is sufficiently enlarged and extended to the primary cementum, the openings that may exist in the dentine are thus obliterated. Sealing the pulp canal at this point removes the possibility of bacteria escaping from the dentine to the periapical tissue. I believe that if it were not for the activity of the cementoblasts, pulp canal surgery would not be successful. The cementoblasts are of biologic significance in the repair of all forms of periapical injury.

Do All Pulpless Teeth Become Infected?

The error in the belief that permanent lowered resistance of periapical tissue occurs from pulp removal is evidenced by the fact that the periapical tissues often remain free from infection for a period of years following pulp removal. It is the periodontal membrane that is responsible for successful healing.

The results that have followed the methods of treatment employed in the past have prompted many dental practitioners to conclude that satisfactory healing of injured periapical tissue could not be accomplished following pulp removal. But those who are engaged in a study of this subject, including periapical disease, agree that one of the chief factors in periapical infection is failure to seal the foramina with impermeable materials.

Can the Foramina be Hermetically Sealed?

If the steps suggested here are followed, (1) it will be possible to obtain

Fig. 4

Fig. 5

definite results; (2) guess work will be eliminated; (3) it will always be possible to fill to the desired apical point, absolutely sealing the foramina; (4) all of the pulp tissue can be removed at any desired apical position without undue injury to the periapical tissue. Since the reamers are larger than the canals, it is obvious that the cutting of dentine will result when the instrument is extended to the apex; by doing so, all of the pulp tissue will be removed. Fig. 6 illustrates what can be accomplished in any canal where a fine broach can be extended to the apex; there are only a small percentage of canals where a fine broach cannot be passed to the end. The roentgenograms do not represent selected cases nor cases of simple, single-rooted teeth.

In order to fill a space in a canal, it is first necessary to ascertain the amount of material required by knowing the length and diameter of the space in question. Overfilling and underfilling of canals can be avoided if this rule is applied.

Technique for Filling Canals

1. The length of the canal is ascertained by an instrument I have devised, which is also a broach holder. The holder has an open slot that extends through the center of the handle with a millimeter scale on each side of the groove.

2. The approximate length of the root is obtained from the chart, which was compiled from the measurements of length and diameter of several hundred teeth. When the tooth in question is to be operated upon, the chart is consulted to obtain the length, and a fine smooth broach is inserted into the holder to the proper reading of the scale on the holder. The instrument is then extended into the canal until the holder is stopped by a shoulder, which has previously been established in the pulp chamber as a landmark from which to measure. A large bur should be used to enlarge the canal toward the apex.

3. A roentgenogram is taken to ascertain whether the apex has been reached. Since the estimate on the chart is only an average length, the roentgenogram may show that the broach does not quite reach the apex,

Fig. 4—Longitudinal section showing dentino-cemental junction at A. The filling should terminate at the junction or in the apical cementum in order to seal the foramen.

Fig. 5—Longitudinal section showing dentino-cemental junction at A. The filling should terminate at junction or in the apical cementum in order to seal the foramen.

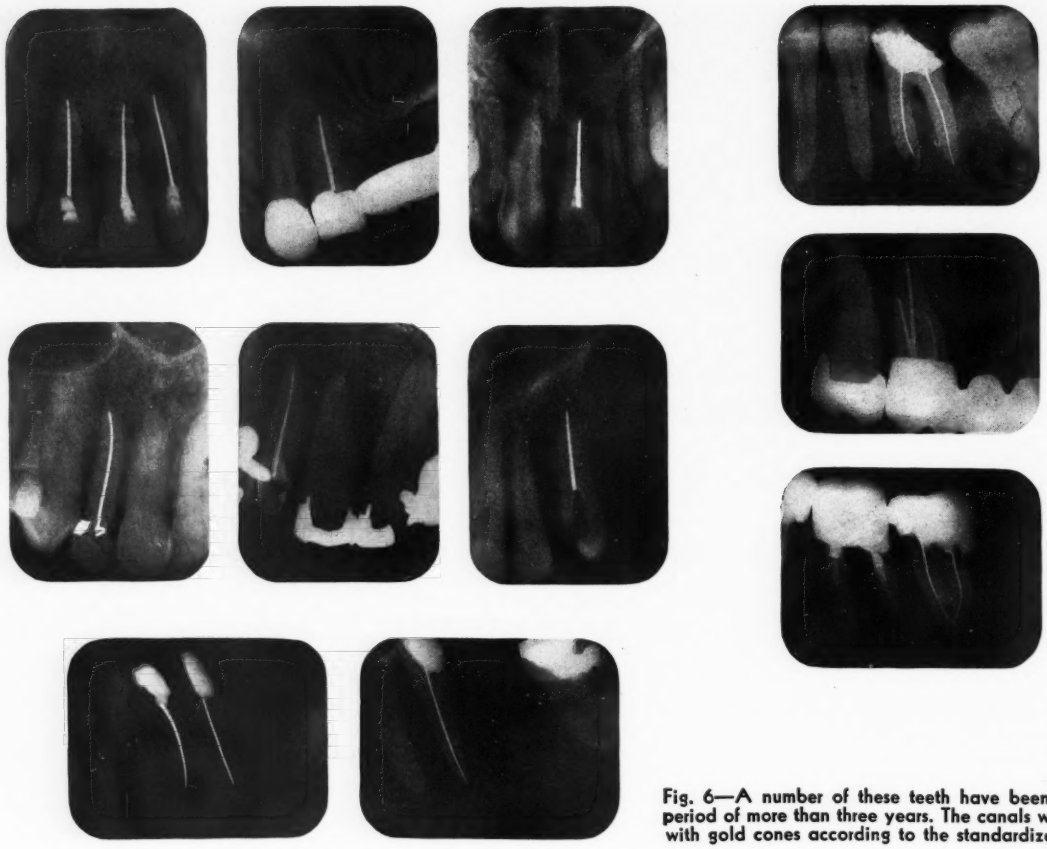


Fig. 6—A number of these teeth have been filled for a period of more than three years. The canals were all filled with gold cones according to the standardized technique

or that it passes through the foramen. The broach should be adjusted as the case may require. If the proper point has not been reached, another roentgenogram should be taken. When the proper point has been reached, the reading on the scale of the holder is noted and recorded for reference in the use of reamers or barbed broach in case the pulp is to be extirpated.

All broaches, reamers, and files are the same length, which makes it possible to reach the same apical point with any of the instruments when they are placed at the same reading in the holder. When the exact length of the canal has been obtained, the diameter must also be known, and this is obtained from the reamer indicated for the tooth in question.

4. The reamer required is determined from the chart, which is indicated by number. The reamer should be inserted into the holder to the point recorded; then, one proceeds to ream until the holder is stopped by the shoulder. The same apical point will be reached by the reamer since the instruments are all the same length. A file of the corresponding number should now be used in order to smooth the canal. The diameter and length of the canal having been obtained, the filling operation is simplified.

5. Gold cones, standardized to the reamers, are used as the filling material. In conjunction with the cone, a small amount of liquid condensite (Neurolite) is first introduced into the canal. This liquid hardens at body temperature; it is impermeable, and will be tolerated by the tissues. Only a small amount of the liquid should be employed, since the cones are standardized to the diameter of the canal.

6. To assure the proper apical placement of the cone, and avoid overfilling or underfilling, a plugger is placed in the holder at the same reading as other instruments. When the cone is forced into the canal with this instrument until the shoulder is reached by the holder, the cone will reach the same apical point as the instruments, and the Neurolite will be carried into the openings of the multicanals, thus sealing all the openings to the apex. Underfilling or overfilling will be made impossible by this procedure, because the holder cannot pass beyond the shoulder established in the pulp chamber. There are only four sizes of reamers and files required.

7. Following the proper placement of gold cone, the pulp chamber is filled with cement.

The reamers used do not have a long cutting blade, only about 7 mm. The reason for this style is to avoid unnecessary reaming. Only the apical third of the canal is prepared for the cone, and the cones are made to fill only the apical third of the canal. If the apical third of the canal is tightly sealed, it will not be possible for bacteria to reach the periapical tissue. In fact, such a filling will be as efficient as if the entire canal were filled. The operation will consume only about one-half the time required to ream and fill the entire canal. There is no advantage in enlarging the remainder of the canal.

Instruments

The diameter of the reamers and files suggested for each tooth was determined from the measurements of the diameter of the canals of the teeth for which they are designed. The instruments required for each tooth can be ascertained by consulting the chart, compiled from the measurements of the diameter of each canal. This information makes it possible to avoid selecting an instrument either smaller or greater in diameter than the canal,

The following is a table giving the length of roots compiled from the measurements of several thousand teeth. The reamer required for each tooth is recorded.

REFERENCE CHART

UPPER TEETH	Length of root	Reamer Required	LOWER TEETH	Length of root	Reamer Required
Central	12¼ M. M.	No. 28	Central	11¾ M. M.	No. 25
Lateral	12¾ M. M.	No. 27	Lateral	12½ M. M.	No. 25
Cuspid	17 M. M.	No. 27	Cuspid	15 M. M.	No. 25
First Bicuspid	12 M. M.	No. 26	First Bicuspid	7½ M. M.	No. 26
Second Bicuspid	13¾ M. M.	No. 27	Second Bicuspid	14 M. M.	No. 26
First Molar	12¾ M. M.	No. 25	First Molar	13 M. M. Mesial R. / Distal R.	No. 26 / No. 25

The reamers referred to in the Chart are Kerr Reamers Nos. 25-26-27-28, upper and lower.

which would make it difficult and sometimes impossible to reach the apex.

If satisfactory results are to be obtained, instrumentation must be placed on a scientific basis. I cannot conceive of how an instrument can be properly designed unless the diameter of the canal is first known. There must be some means of identification of each instrument if an intelligent application is to be made.

Classification and Treatment of Pulpless Teeth

For the purpose of simplifying the treatment of pulpless teeth, I have worked out the following classification, which is, I believe, an aid in deciding which teeth should be treated, and which should be extracted:

Class 1. Noninfected pulps of recent exposure.

Class 2. Infected pulps.

Class 3. Acute periapical infections.

Class 4. Partly filled canals with noninfected periapical tissue.

Class 5. Chronic periapical infection.

1. Noninfected exposed pulps, in Class 1, are those accidently exposed. If asepsis is maintained, the pulp can be removed immediately, and the root canal operation can usually be completed at one sitting. When it seems advisable to divide the work into two or more sittings, only a mild antiseptic should be used as a dressing. A 10 per cent solution of cresol in glycerin makes a satisfactory remedy for this purpose. It is miscible with water in all proportions because of the glycerin content; it will, therefore, also mix with the serum that is likely to exude from the periapical tissue into the canal. The advantage of a remedy possessing such properties is that the exudate becomes a part of the antiseptic solution, which prevents, at least for a short time, the serum from becoming infected. Another favorable feature of this remedy is that it is not irritating to the periapical tissue.

2. The pulp chamber, in cases of Class 2, is opened with a round bur, and the débris is removed from the pulp chamber. The mouth of the canals is opened with a sterile barbed broach. Extreme care must be used to avoid forcing any infectious material through the foramen. A small pellet of cotton, saturated with a solution of chloral hydrate and thymol, is then placed in the pulp chamber, sealed, and left for three or four days.

At the second sitting, the rubber dam is adjusted, and the tooth swabbed with alcohol, iodine, or mercurochrome. As much of the decomposed tissue as possible is removed, without forcing any material through, by the use of sterile instruments. Another dressing of chloral hydrate and thymol is sealed in and allowed to remain for three or four days.

Strict asepsis must be maintained at all times. At the third sitting, the rubber dam is again adjusted. If the dressing is free from odor, a culture is taken. If it is found negative, the canal is filled according to the method described in the technique.

The chloral hydrate and thymol preparation is made with equal parts of thymol and chloral hydrate, which is triturated in a warm mortar until it is liquefied. Sufficient acetone should be added to keep the mixture in solution, about one-third by volume. Thymol is used for its germicidal power; acetone dissolves fats, making the penetration of the thymol more effective. The chloral hydrate is used because it unites chemically with the gases of putrefaction. This permits sealing of the remedy in canals where decomposition occurs, and thus prevents pain after the teeth have been sealed. One need not hesitate to seal this mixture in teeth with decomposed pulps. I have done so successfully for fifteen years.

3. Acute periapical infections may be treated with chloral hydrate and thymol until odor disappears. A culture is taken, and, if it is negative, the canal is filled.

It is my belief that acute periapical infections usually can be successfully treated, but these cases should always be regarded as being somewhat questionable for there is no positive way of determining the acute stages.

4. In the treatment of partly filled canals with noninfected periapical tissue, a rubber dam is placed on the teeth, and, proceeding aseptically, the root filling is removed. A culture is taken, and the chloral hydrate and thymol mixture is sealed in the canal. If the culture is negative, the canal is filled at the next sitting; if positive, the canal is treated as in Class 2.

5. A chronic periapical infection is hopeless. In my opinion, chronic infection cannot be successfully treated. It may be possible to obtain satisfactory results, but, to my knowledge, no one has so far offered a successful method.

1001 Lowry Medical Building.

ANNOUNCEMENT

The eighth installment of the article A COMPLETE FULL DENTURE TECHNIQUE by C. J. Stansbery, D.D.S., which was announced to appear in December, the present issue, is being held over until the January, 1934, number, owing to lack of space.

The Editor's Page

SOME of us within recent years have been accused of possessing a "state-panel-dentistry phobia." The Tories in the profession, with a heavy hand of sentiment and naïve utterances of optimism, have assured us that "private practice is not threatened"; "state dentistry will never come to this country"; "the American people are not socialistic-minded."

In March, 1932, in this department it was stated, "But it is not easy to pass off the threat of state dentistry. Paternalism in government and taxation orgies do not assure us that socialized medical practice is impossible. . . . we should oppose popular points of view that are likely to place an undue emphasis on free dentistry for the underprivileged—at the expense of the private practitioner. . . . to give free dental services indiscriminately and unwisely would be as demoralizing as to give away free food, clothing, shelter to the undeserving. We should fight the 'dental dole'."

These words, as was said, were written in March, 1932, before: the Final Report of the Committee on the Costs of Medical Care; the advent of the *New Deal;* the release of the federal Rules and Regulations governing medical care for the unemployed. These three events along with the present philosophy of government should do something to disturb the serene thoughts of the Tories and reactionaries who have no fears for the future of private and individual practice.

A year and a half ago the term *dental dole* was a mere editorial catch-word; today the expression is a cold fact. Throughout the country many people are receiving dental care from individual practitioners or dental organizations free or at a degrading scale of fees. Dental societies in many localities, with a false sense of philanthropy, are entering into agreements with local relief agencies to supply dental services for the unemployed at fees below the production costs level. So long as dentists are subject to taxation, rents, and the fluctuations of the price system they must produce their services at a production cost plus fair-profit level of fees.

The spirit of the recovery legislation for industry and agriculture is to assure profits to the producers of economic goods. If the producers of economic services (dentists, physicians, for instance) are to be paid at the bare production cost margin their economic life is doomed. The paradox of increasing prices for economic goods and decreasing prices for services is apparent.

In the letters from readers commenting on the emergency dental relief programs, some of which have been published elsewhere in this issue, there is no hint that dentists are antisocial, misanthropic, or unmindful of the need and urgency of dental care for the unemployed and indigent. Dentists accept their obligations to society and are quick to make their contribution. Dentists, and particularly their official spokesmen, should insist that professional values be preserved and that the profession suffer from no discriminating or uneconomic practices under relief activities.

Once again we emphasize that it is the function of the American Dental Association to define the conditions under which the dental profession will function under any and all nonprivate systems of practice.

SOME COMMENTS ON EMERGENCY DENTAL RELIEF PROGRAMS*

History shows that great economic and social forces flow like a tide over communities only half conscious of that which is befalling them. Wise statesmen foresee what time is thus bringing and try to shape institutions and mold men's thoughts and purposes in accordance with the change that is silently coming on.

The unwise are those who bring nothing constructive to the process, and who greatly imperil the future of mankind, by leaving great questions to be fought out between ignorant change on one hand, and ignorant opposition to change on the other.

—John Stuart Mill.

It is obvious that any dentist who reads *The Editor's Page* in the DENTAL DIGEST for October will shortly form a definite opinion concerning the provisions for medical and dental care which will be offered to recipients of unemployed relief. It is probably equally obvious that the problem may be clarified if many of these opinions are gathered together and published. Organized dentistry is simply a group of individual dentists banded together for a common good, and attempting the solution of mutual problems.

As outlined in the abstract of the Federal Emergency Relief Administration, dental care for the social class mentioned is to be accomplished as a result of an agreement between the relief administration and organized dentistry. Such agreement is to be arrived at by finding the minimum treatment consistent with safety, and by fixing the minimum charge which even an idle practitioner might be willing to accept as sure compensation for such services.

The machinery of authorization for such dental service must originate through local relief boards, who, presumably, will be in possession of lists of individual practitioners selected for the performance of such service.

At the present time, most ethical practitioners view with apprehension much of the considerable agitation for socialized dental service. This apprehension is caused, not by any unwillingness to aid in providing help for the indigent, but by a feeling of suspicion when any public health endeavor is allowed to become involved in the machinery of politics.

It may be that the Rules and Regulations published in the abstract in the October DIGEST may supply the entering wedge for concerted and enthusiastic action, and that the dental as well as the medical profession may realize forcibly that unless they keep their own houses in order, agencies more powerful and less unselfish will do the work for them. Such a prospect is not pleasant, and it is hoped that those in charge of authoritative professional publications will use their influence to see that the organization and supply of dental service remain where they belong—within the profession.—*John W. Cooke, D.D.S., Boston.*

There is no doubt that something must be done for unemployment relief in the field of dentistry; however, we must guard against the possibility of panel or state dentistry. Members who are appointed on the State Relief Board to determine fees should not be swayed by the fact that the beneficiaries are unemployed and unable to pay. When the government buys food, clothing, and other necessities for the unemployed, does it buy it at wholesale production cost? No! It buys it at retail price the same as you or I. Then, why should dentistry, as much a necessity for health and happiness be given at production cost?

A merchant determines his profit from his investment and responsibility and certainly our investments are as great as many businesses and our responsibility much greater.

I am, however, deeply interested in unemployment dental relief and would like more information as to how I could assist in this locality.—C. M. Camp, D.D.S., *Spokane, Washington.*

With regard to the circular, number 7, issued by Mr. Harry Hopkins of Washington, D. C., director of the Emergency Relief Service, there are roughly speaking about twenty million men, women, and children eligible to unemployment relief in the United States. Food, clothing, and shelter were the first on the list of necessities to be supplied by the Government to this group. The issuance of circular number 7 adds medical and dental care to this list of necessities and it also outlines how the care is to be provided. Committees from the state medical and dental societies are requested to meet and cooperate with the state emergency relief officials to fix fees for service and to make arrangements for distributing patients to the local profession. The final authority, however, rests in the Emergency Relief Service officials.

The recognition by the federal government of medical and dental care as a necessity for the unemployed and their families is a first step in developing a new pattern of thought and action that may have a far-reaching effect on the future of health care and those of the profession who render it. Medical and dental care has been given the unemployed during the depression before circular number 7 was issued but in a haphazard, uncoordinated manner. The rate of increase in the use of funds for medical care and dental care of the unemployed during this period is made evident by the following figures for payments to health agencies during the past few years in Chicago (federal and state funds).

Year	Amount
1931	$ 53,889.25
1932	$214,146.83
1933	$713,035.36
1934 *Estimated*	$1,049,786.50

Of these funds there was allocated for dental care through the Chicago Dental Society:

Year	Amount
1931	$
1932	$ 7.500.00
1933	$41,647.13
1934 *Estimated*	$84,000.00

Twenty million people receiving their dental and medical care (such as it is) under an agreement entered into between the state or local medical or dental society and a government agency—fixed fees paid for by tax funds—is the method of charge and payment. According to all definitions this relation is direct state medicine of the type endorsed by the Minority No. 1 Report of the Committee on the Costs of Medical Care under Recommendation II; namely, "The minority recommends that government care of the indigent be ex-

*These are some of the comments sent to the editor in response to the editorial appearing in the October, 1933, issue of the DENTAL DIGEST.

panded with the ultimate object of relieving the medical profession of this burden.

Will the method prove successful for the unemployed, and if so, will the same pattern of service be extended to the six million unemployed who it is stated will go to work this winter on government projects for a weekly wage of fourteen or fifteen dollars? Experts agree that fourteen or fifteen dollars a week will barely supply a family with food, clothing, and shelter and leaves no margin for health care. The government recognizes health care as a necessity for unemployed, its wards; can it do less for its semi-wards, the low-paid employed? If successful for this group, can the method be extended to all industrial groups?

In my opinion, up to the present all trends have indicated that some form of compulsory health insurance would be the future method used to give health care to the industrial workers of the nation. The present situation presents possibilities that direct government care may supersede insurance and that state medicine may be the pattern that will survive.

In a period of rapid social change any pattern of action that works and gets results may become crystallized into a permanent form. This may be especially true of medical care where professional organizations have until now considered private practice as fixed and unchangeable and have refused to make plans of any kind to meet possible changes in method of payment for service. This lack of previous planning places them at a disadvantage when a mandate like circular number 7 demands immediate action and adaptation.

Had the profession anticipated change and made plans to meet it as have some of the industrial leaders like Gerard Swope, the government might have recognized the planning ability of the health professions and have had a health service advisory commission at Washington in addition to those of industry and labor. The nation might then have witnessed the chaneling of professional service for the nation by intelligent, well-informed, public-spirited representative members of the professional groups. It is not yet too late. If the rank and file of the professional organizations will put sufficient pressure immediately on the national officials, it is possible for action to be taken that will give the professions a leading part in shaping the health service pattern for the future.

—Herbert E. Phillips, D.D.S., *Chicago.*

On *The Editor's Page* of the DENTAL DIGEST, October, 1933, is published an abstract compiled from "Rules And Regulations Governing Medical Care Provided In The Home To Recipients Of Unemployment Relief" as released by the Federal Emergency Relief Administration. The parts in which members of the dental profession would be especially interested constitute the *abstract*. The editor, wisely or unwisely, makes no editorial comment but invites such from members of the profession.

It is not quite clear by what authority such rules and regulations are issued by a federal administration to states and local relief organizations, for unless our conception of the federal government of the United States is wrong, Congress or the executive branch of our federal government has no powers except those specifically delegated to it by the states. At least this is what we have been taught in the past. Has this all been changed?

However, regardless of whether there is any constitutional authority, the rules and regulations as set forth will undoubtedly carry much weight, and therefore bear careful scrutinizing. Needless to say the dental profession should cooperate with all legally established authorities for the relief of suffering and the protection of health at all times, and especially in times of stress. That dentists as individuals have done this needs no argument.

Considering the rules and regulations on their merits, then, aside from the question of authority, they are analyzed in the order in which they are published.

1. *Policy*: It is gratifying to know that the relief administration recognizes "organized dentistry" as well as other branches of the healing art, and also the "traditional dentist-patient relationship." It is further gratifying to know that dentistry is recognized as an integral part of general medicine, as evidenced by the last sentence in paragraph B which reads, "The common aim should be the provision of good medical service at a low cost to the mutual benefit of indigent patient, physician, nurse, dentist, and taxpayer."

Paragraph B provides that the dentist "Furnish the same type of service to an indigent person as would be rendered to a private patient." It is to be hoped that this goes without saying, that the service rendered indigent patients at the taxpayer's expense should be the "minimum consistent with good professional judgment" is also self-evident.

There may be some question, however, as to whether there can rightfully be a fee rate agreed upon in advance. This would seem no more practical than it would to agree in advance on the price of commodities furnished the indigent by relief agencies. When dentistry is placed on a "piecework" basis, the patient's best interests are bound to suffer, and the dentist's self-respect and standing will be lowered.

2. *Procedure*: It would seem perfectly logical and right that only the local relief officer or agency have power to authorize professional care, as provided in paragraph A.

Paragraph B reads as follows: "Medical care shall not ordinarily be authorized by relief administrations for conditions that do not cause acute suffering, interfere with earning capacity, endanger life, or threaten some permanent new handicap that is preventable when medical care is sought." That seems to be a well considered and concisely worded provision, and the subject should end here, for dentistry has already been placed in the same catagory as all other branches of medicine, and this paragraph is broad enough to cover everything.

Unfortunately another sentence is added which reads, "Dental care shall, in general, be restricted to emergency extractions and repairs." Whoever is responsible for that sentence must have a very narrow conception of the practice of dentistry and its relation to health. In the first place it would prevent anything from being done until a condition is extreme, and in addition smacks of the thought that dentistry is a trade, chiefly concerned with the "repair" of inert materials.

Under such a rule an indigent child, with dental caries must go uncared for until the teeth are lost, and that child's chances in life are seriously and unfavorably affected. This is not as it should be, and I want to urge all members of the profession to use their influence with local relief officers to the end that dental treatment come under the same provisions as provided for other branches of the healing art in the first part of paragraph B; namely, that care should be authorized only for such conditions as "cause acute suffering, interfere with earning capacity, endanger life or threaten some permanent new handicap that is preventable."

3. *Fee Schedule*: The state cannot, nor does it attempt to employ plumbers, carpenters, bridge-builders, or any mechanic on the basis of a flat rate per sewer, building, bridge or what not. Neither can the state or

local relief officer set a flat rate of so much for a basket of groceries, or portion of tobacco. Then how in the name of common sense can it be expected that a flat rate schedule of professional fees can be arranged where the nature of the services varies so widely as must necessarily be the case in "emergency extractions" or other operations and treatments for saving life or limb, or restoring a person to normal health? Any oral surgeon knows that an extraction may prove to be a major operation, taxing the skill of the most experienced. I agree with the second and third paragraphs concerning "Fee Schedule." In view of "The certainty, simplicity, and promptness of payment" dentists can well afford to charge a lower fee than usual, for any given treatment. This will be to the interest of both dentist and taxpayer.

4. *Medicine and Medical Supplies*: It would seem quite right that prescriptions should, so far as possible, be restricted to the National Formulary or U. S. Pharmacopeia, to the end that relief funds may not be needlessly wasted in paying for trade names.

5. *Authority*: Obviously there should be some uniformity of system in extending medical relief to indigent persons in the various communities. (The term "medical relief" is here used to include every form of relief from human suffering, preventive, palliative, curative, or restorative.) That the state relief agencies should coordinate the activities of the different relief officers within their respective states seems logical. Here, again, arises the question of whether or not the federal government has any constitutional authority to dictate to the states what they shall or shall not do in this respect.

6. *State and Local Professional Advisory Committees*: This whole section recognizes the fact that within the organized dental profession is the place to look for authoritative information on questions pertaining to our branch of the healing art, by making it mandatory on relief administrator to request advice and help from state and local professional organizations in formulating and carrying out programs for medical care of indigents. This is as it should be and it is to be hoped that members of the profession will not sidestep the responsibility.

7. *Licensed Practitioners of Medicine and Related Professions*: This section, while recognizing license to practice as the *legal* qualifications for participation in the program of medical care of indigents, gives opportunity for organized dentistry to exert a beneficent influence by maintaining, upholding, and disseminating the high professional ideals for which it stands, and to guard against those persons in need of relief falling into incompetent or unscrupulous hands.

It is to be hoped that members of organized dentistry will rise to the occasion and that men of broad vision will be appointed to the committees provided for in the "Rules and Regulations" under discussion, to the end that Emergency Relief Administrations, federal, state and local, give to dentistry the same consideration and place in the field of medicine as other specialties. And further that such public funds as are paid out for the care of indigent persons shall be spent with as much care and intelligence as possible.—A. T. Rasmussen, D.D.S., *La Crosse, Wisconsin.*

In this locality the needs of the unemployed for dental services are becoming very pressing. We dentists are not able financially to take care of it. The Red Cross organization here has been providing, in a limited way, for emergency extractions and treatments. But the demand is becoming greater. Patients with pyorrhea are presenting who should have all the remaining teeth extracted for the sake of health. Hundreds of people are compelled to allow their teeth to decay beyond repair. This means more abscessed teeth to menace health. Undernourished, as most of them are, they are not able to resist these conditions.

It seems to me, that some plan is advisable. If the government is willing to undertake it, I believe we of the dental profession can well afford to get in behind it and meet it part way. We would have to make a reduction of fees, no doubt, but as it is now we do not receive any fees from these people and are not likely to for years to come. A smaller fee would be better than no fee at all. Also we would be aiding in a good cause—the preservation of health. As I understand it, these patients would be required to obtain their orders through the local board. This board would investigate all cases to see if they are justified. This procedure ought to hold the number down to the minimum. It is my opinion that the board will strike a snag if it attempts to parcel out the work among the different dentists on its own (the board's) judgment. It might be better to allow the patient to select the dentist desired.

It appears that the dental phase is to be placed in the hands of the state organizations. This will give the dental profession control over the procedures. This will be far better than some sort of panel dentistry administered by political appointees. If we fail to cooperate, we may find ourselves facing something of that kind. —J. F. Nelson, D.D.S., *Parsons, Kansas.*

THE EMERGENCY DENTAL PROGRAM OF SUMMIT COUNTY OHIO.

The history of dental care for the indigent residents of our locality has doubtless been similar to that of most of the communities of this country. Volunteer service has been accepted from the members of the profession. They have been asked to give of their time and knowledge both in organized clinics of hospitals and schools and also in their own offices. It is needless to say that the burden of this work has fallen on the shoulders of a few dentists.

This type of service has been subject to criticism within the ranks of the profession and especially so when the annual Community Chest Drive brings to attention the ways and means of handling the other services offered the indigent families. Food, shelter, and clothing are furnished for cost plus a small percentage for overhead, while the dentists and physicians are asked to donate cash to the Community Fund and also to donate services, materials, overhead costs, etc. for these families.

A short time ago the report of the Committee on the Costs of Medical Care was published. I commend to your attention the twenty-eighth volume of this monumental work. The recommendations of the Principal Minority Group, listed following page 150, are cited as being outstanding in this book as they seem to be the entire basis of the work that has been started in this country.

In September, 1933 the Federal Relief Administration in Washington made available an amount of money, which in our case amounted to $1.00 per family per month, to be used for dental and medical care of the recipients of unemployment relief. A set of rules was formulated to be used as a basis of operation. Actual program details were left to the local relief administrator and a committee from the dental society. The President of the Akron Dental Society designated the standing Committe of Public Health as the committee to work with our Relief Administrator, Mr. George Missig. A number of meetings were held in an attempt to form a policy and to agree on the type of work to be undertaken.

The money available was so limited that no attempt was made to establish a minimum charity fee but rather to set a figure for reimbursement of the dentist for the direct cost of actual supplies used in taking care of these relief emergency cases. It was kept in mind that many of the patients on the relief lists today were not there last year and that there is perhaps a slight material benefit for the dentist in keeping his name before the public. Also the fact was recognized that the rent and salary items and other overhead costs are not increased by the addition of one or more patients each week.

The committee asked the dental society members and other ethical dentists voluntarily to sign an agreement to care for the emergency dental needs of certain persons who were already on the registered relief lists and who consequently had been certified as deserving cases by the social service organization. The dentists signifying their willingness to accept such patients numbered fifty-one out of 116 men in the county. A list of these dentists was furnished the subdivisions of the charity organizations.

When a person on the charity list needs emergency dental attention he, or his guardian, applies for care at the agency to which he goes for food and clothing orders. The applicant is requested to name his regular dentist; then, if this dentist's name appears on the list, the applicant is given a written order to take to the dentist which authorizes the latter to attend to the case. If it happens that the family dentist is not on the list the applicant is given the names of several dentists in his neighborhood and is asked to select one to whom he wishes to go. This at once relieves the organization from the liability of recommending someone and assuming responsibility for the work and decisions of the dentist over whom it exercises no control. It is, of course, stated in the agreement that the type of dental service rendered to each indigent person shall meet the accepted standards of dental practice in the State of Ohio. Nevertheless it is found that many charity patients are critical and often voice more complaints than regular paying patients.

A toothache is the motivating force that drives most of the patients to the dentist and the safe remedy for the undernourished patient is extraction of the tooth in question. For an extraction with the use of local anesthesia the dentist receives $.50 per tooth; if a general anesthetic is needed an additional sum of $2.50 is granted.

The physician may wish to eliminate focal infection. Such a case is handled in the usual manner: the dentist takes and interprets roentgenograms and extracts teeth found to be sources of infection. This work may progress according to the professional judgment of the operator. The sum of $.50 is allowed for each x-ray film with a maximum amount of $5.00 for a set or series of films. Teeth may be saved for some by a restoration; $1.00 is allowed for each filling. The committee feels that this will provide actual materials for whatever type of restoration the operator decides is needed, whether it be silicate, amalgam, or cement.

Fractures and special surgical work are handled by individual estimates and agreements made with the agency issuing the order for the service. The dental committee stands as a court of appeal whenever the dentist wishes recognition for unusual circumstances.

Repairs of dentures may be made with a cost not to exceed $3.00.

A Vincent's infection must be verified by a positive smear report from the health department, and a maximum sum of $5.00 plus the cost of medicines furnished the patient is allowed for the entire treatment of the case.

An occasional person may be found in distress from inadequate service received or may present himself with a history of pain and infection following the incomplete removal of a tooth. In such cases the sum of $5.00 is granted for the recovery of roots, postoperative treatments, necessary x-rays, or whatever else is required.

Whenever emergency service is requested for a patient who is unable to go to the office a fee of $2.00 is established for a house call.

It has been further provided in the signed agreement that the dentist may have his name removed from the list of volunteers whenever he makes the request in writing. The dentist agrees to carry liability insurance in order to qualify for relief work. He also reserves the right to refuse any new case which in his professional judgment he should not handle.

Such an outline for the conduct of this type of practice is subject to revision as experience shall dictate. The right is reserved for the committee to amend the regulations from time to time.

In the first month of this service there has been surprisingly few requests for dental attention. The success or failure of this emergency charity service will depend largely on the honest understanding of the aims of the federal program and the wholehearted support from the dental profession.—William J. Ream, D.M.D., *Akron, Ohio.*

"Resolutions and Recommendations, Relating to Dental Care of the Indigent & Unemployed, Adopted by the Ad Interim Committee of the House of Delegates of the Ohio State Dental Society, at A Special Meeting Held Nov. 11, 1933."

"1. The Ohio State Dental Society recognizes that the conservation and maintenance of the public health is a function of Government.

"2. We agree with the policy of the Federal Emergency Relief Commission, as announced in Rules and Regulations No. 7 approved by the State Relief Commission, which 'recognizes in their legal and economic limitations, the traditional dentist-patient relationships in the authorization of Emergency Dental Care,' and futhermore, we agree with the policy of the Commission, which permits the recipients of dental relief within the limitations of the registered list at Relief Headquarters to exercise their choice of a dentist.

"3. We recognize that the dental and medical care necessary for the recovery of the indigent sick, as well as the dental and medical care of the victims of the depression, who are sick and without funds and employment, must of necessity be administered to by the legally qualified members of the health professions.

"4. We believe that this condition is a public responsibility, and that the burden of this health service should be assumed equally by all groups.

"5. The dental profession has endeavored to preserve its traditional practices and precepts, by retaining relationships which are humanitarian, and will continue to do so even in face of the fact that its members have experienced losses as a result of the depression in common with all other groups.

"6. In Supplement 1, 'To Federal Relief Administration Rules and Regulations No. 7, governing the expenditure of Federal and State Funds for medical care in the home to recipients of Unemployment Relief,' we find dentists referred to as specialists, as follows: 'In all emergencies requiring the assistance of a specialist, such as eye, ear, nose, throat, surgeon, dentist or nurse, same will be called only on the recommendation of the physician in attendance who has seen the patient in his home or at the physician's office.'

"7. As announced in Rules and Regulations No. 7, issued by the Federal Emergency Relief Commission,

we find that 'dental care shall, in general, be restricted to emergency extractions and repairs. Dentists and dental care shall be subject to the same general restrictions indicated for physicians under Regulation 1.'

"8. It is evident, therefore, that the dental fee schedule is limited to 'extractions and repairs.' Interpreting 'repairs' as being applied to artificial dentures, we respectfully suggest as supplemental to this schedule the adoption of a more extended list of dental services and fees in order to meet more adequately the requirements of emergency dental care.

"9. Because of the differences in practices, which are peculiar to the various sections of the State according to localities and environmental conditions, it is our opinion that the adoption of a uniform fee schedule for the entire State is impractical.

"Therefore, we submit the following recommendations:

"A. The State Relief Commission, in Supplement No. 1, provides that the County Relief Director, or other proper official, shall announce the plan of procedure to the County Medical Associations. Therefore, we recommend the same procedure be followed as relates to the Dental Societies. Also, the phraseology in Item 6 of the foregoing should not be interpreted as requiring all recipients for dental relief to be examined and referred by a physician, before being eligible for dental treatment, except where the case is receiving medical treatment by the said physician who has recognized some dental complications. Further, we recommend that dental materials, supplies and necessary drugs be included and provided for under 'Regulations governing medical care provided in the home to recipients of Unemployment Relief'; or, that due consideration be given to the fact that the cost of dental supplies will relatively increase as the fees for dental services in which they are used, are relatively reduced.

"B. That the proportion of the Federal State Funds available be supplemented by Local Funds as a basis for fee determination in accordance with provisions in Federal Regulations No. 7, which states: 'This schedule shall not only apply where the expenditure of Federal Funds is involved, and shall not preclude the payment of additional amounts from Local Funds.'

"C. That the working dental fee schedule or schedules, adopted shall be arrived at in conference between the Relief Officials of each community, entitled to receive Federal State Funds for Unemployment Relief, and the official representatives of the Component Dental Societies in which each community is located.

"D. That the agreement between the State or Local Relief Administration and the officers of the Local Component Dental Societies 'shall include a fee schedule covering the basic and special (dental) services. . . . All fees shall be established on the basis of an appreciable reduction of the prevailing minimum charges for similar services in the local communities, with due recognition of the certainty, simplicity, and promptness of payment that authorization from the Local Relief Administration insures.'

"E. That in those communities where Federal State Funds are not available, the principles set forth in this statement shall be observed as far as local conditions will permit.

"F. It is understood that any fee schedule adopted, approved, or in effect locally, shall apply only for dental service to the indigents or needy unemployed, and during the term of the present emergency only, and the fees in connection with this service 'are not intended to establish such low rates in ordinary practices.'

"G. That in view of the fact that the relief program is emergency and temporary, the health professions in each community, through their official organizations, reserve the privilege to determine when such an emergency shall be terminated.

"It is agreed by the Ad Interim Committee of the House of Delegates of the Ohio State Dental Society that this statement shall be transmitted to the State Relief Commission for its information and to the Secretaries of the Component Societies for their information, guidance and comments."—THE OHIO STATE DENTAL SOCIETY, Alden J. Bush, *President,* Edward C. Mills, *Secretary.*

The emergency and temporary features are important, but I believe that the method of fee determination is the bone of contention. The threat is, if organized dentistry does not come across with a flat fee schedule, low enough to be universally applicable, the relief commission will do this job themselves and follow up by employing dentists on their own terms, and let organized dentistry hold the bag.—A. J. Bush, D.D.S., *Columbus, Ohio.*

I could scarcely venture a clear cut statement on a service which is an "Emergency Measure," except that this may have a far reaching unfavorable professional effect on dentistry ultimately. The very implications—"Medical and Dental care of the indigent," at lowest and less than lowest fees, strike me as a move to supply poor dentistry to the poor. At best, an approach to the unhappy Panel System so much discussed.

I emphasize, dentistry, for good dental care as I see it, is too varied—essentially too elastic to permit of rigid fee-fixing. Plainly, it is a professional service plus, yet not a commodity.

Even medical care presents no such problem, for purely health service could have only one quality—the best we have to offer. Medical care could be gaged at so much per visit, so much per diem hospitalization, so much per operation (with some modifications of the latter). But in dentistry, when is an extraction an emergency measure and when not? When is a simple avulsion and when a major operation indicated? When is a filling simple and when complex? What of root therapy? Will the relief administrator, or the Dental Advisory Board look on a complex pathodontia service, such as the saving of a pulpally involved important tooth, as an emergency? Can a fee be fixed here to attract the service of especially skilled dentists which it requires? I doubt.

Pertinent to this, I must refer to the statement in my article, "Why Fight State Dentistry," (Oral Hygiene September, 1933) "Dental disease though largely chronic nevertheless is absolutely inescapable." It should be plain that it differs from medicine in that 80 per cent of medical complaints automatically lead to recovery, and hence, as I see it, dental disease is even more pressing a problem, for sooner or later, the state, the public, must pay for its neglect in medical care, in lost production, in lost education, in added police, judiciary, penal and institutional costs.

In the last analysis: What is Emergency Dental Care? What Price Dentistry?

Constructive and helpful as this project of "Emergency Relief" by way of dental care to ameliorate the sufferings of the indigent may seem, or promise for the moment, I fear, as you say, that it "would drive us headlong into the undesirable forms of dental practice which we are striving to avoid."

I advocate state subsidy for dentistry that everyone in the nation may feel this service to be his due not dole; that every dental worker may know his worth to the community and the economic security to which he is entitled. Half measures and too much lay management will thwart the clear cut plan which I have proposed.—Bertram B. Machat, D.D.S., *Brooklyn, New York.*

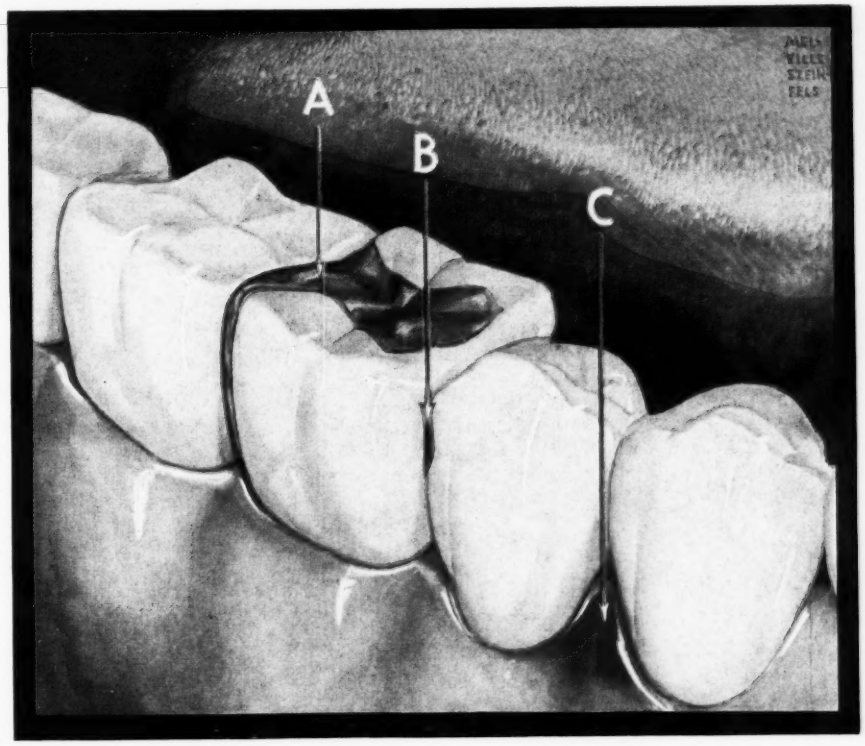
ANNUAL INDEX

Volume 39 Numbers 1 *through* 12

(*Continued on page* 480)

THE EDUCATION OF THE DENTAL PATIENT*

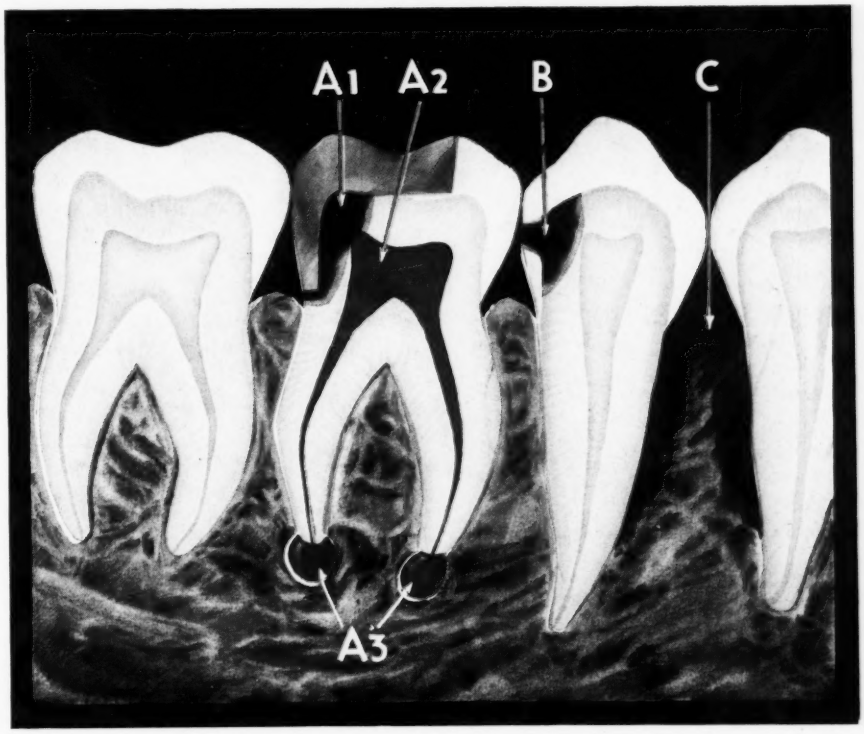
VII. WHAT DOES THE X-RAY SHOW?



BY *visual* examination alone a dentist sees about *one third of the total dental structures*. For instance, he sees: (A) A gold inlay that appears normal; (B) a suggestive dark spot on a tooth; (C) an inflamed area of the gums.

By *roentgenographic* examination a dentist sees the *entire* dental structures, and he finds that: (A) The gold inlay is "leaking;" (A^1) the pulp is diseased; (A^2) there is infection at the root-end; (B) the "dark spot" is a deep cavity; (C) the "inflamed gum" represents a pyorrhea pocket.

OBVIOUS CONCLUSION: Thorough dental examination and intelligent diagnoisis require an "x-ray" examination.



*This chart continues the series intended for the use of the dentist in explaining important normal and pathologic dental conditions to his patients.

Rew

When dental work has been carried out with the greatest possible comfort for the patient, and when it has been completed in a faultless manner, the satisfaction of the patient is the dentist's greatest reward.

Pain often makes it impossible to perform a faultless task, because of innumerable interruptions.

Pain also impels the patient to postpone additional work until some distant date.

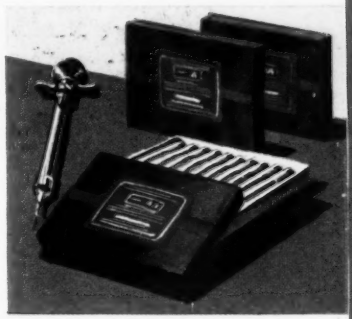
. . . the mere *thought* of Pain keeps many people away from dental offices.

Painless Operative Dentistry through local anesthesia—ensuring complete absence of pain and making possible the full application of the dentist's skill—makes for true reward in dentistry.

ward . . . .

FOR THE DENTIST, THERE IS A REWARD BEYOND DOLLARS AND CENTS.

There is no more efficient means of pain prevention in dentistry than local anesthesia. It requires no expensive equipment, nor any particular training, nor more than the knowledge commonly held by all practitioners. Cook and Waite Local Anesthetics in the cartridge syringe offer such Speed, Simplicity and Safety in administration that Painless Operative Dentistry becomes a simple routine of everyday practice. Isotonic and sterile, Cook and Waite Local Anesthetics also possess low potential acidity. They combine uniform anesthetic potency with freedom from irritation and afterpain.



Plungers that you can control perfectly in Cook and Waite Cartridges! They move easily and smoothly, from beginning to end of the injection—no excess pressure required—injection possible *drop by drop.*

Have you obtained your *free* set of the New Cook-Waite Injection Technic Plates? They are invaluable as reference in the operating room, and for the study of injection technic.

Ask your Salesman!

Carpule
TRADEMARK REG. U.S. AND FOREIGN COUNTRIES
BRAND
CARTRIDGES · SYRINGES
NEEDLES · · · OUTFITS

COOK LABORATORIES, Inc. THE ANTIDOLOR MFG. CO., Inc.
170 Varick Street, New York, N. Y.
Canada: Cook Laboratories of Canada Ltd., Windsor, Ont. Canada: Fort Erie, Ont.

Waite's
TRADEMARK REG. U.S. AND FOREIGN COUNTRIES
LOCAL ANESTHETIC

DIVINUM · EST · OPUS · SEDARE · DOLOREM
"ALLEVIATION OF PAIN IS A SUBLIME TASK"
HIPPOCRATES

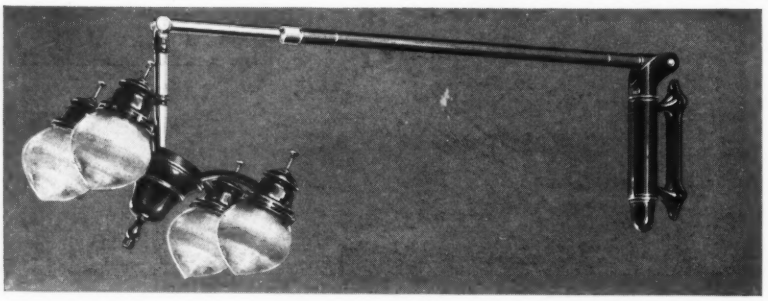
Copyright 1933, Cook Laboratories, Inc

MONEY CANNOT BUY—

NOTHING CAN REPLACE *your Eyes!*

No one can do for the eyes what you can do for teeth. There is nothing more important to any dentist than perfect vision. Yet many dentists are unconsciously endangering their eyes with makeshift illumination—improper or inadequate light which exacts a daily toll in harmful strain. Beware of so-called "dental" lights which "flood" the mouth with a dazzling glare and leave bracket-table, handpiece and cabinet top dark. The sharp contrast in light intensity so produced is the real cause of dental eyestrain. Guard against it permanently with the Pelton Equipoised Light. Its uniform illumination provides complete eye comfort, increased efficiency and permanent protection for your eyes!

Protect them with a PELTON Equipoised Operating Light



Provides EQUAL illumination in the mouth and on equipment.
Wall or Unit Types now $63.00 with bulbs.

THE PELTON & CRANE COMPANY—Detroit, Michigan

ANNUAL INDEX

(*Continued from page* 476)

MOUTH RESTS FOR OPERATIVE DENTISTRY

(*Continued from page* 462)

The rubber is polished with felt wheel and pumice until smooth. The polishing can be facilitated by first using a fine carborundum paper disc in the engine before using the pumice.

For general anesthesia a hole drilled through the center or grooved around the sides to hold a string is added. The rests may be sterilized by boiling, but I prefer cold sterilization with a proprietary solution which seems to help give a black and more highly polished appearance.

The flat sides described are made not only to give more room in ordinary upright use, but also for the patient to bite on when the operator is working on labial or buccal surfaces.

230 Central Park West.

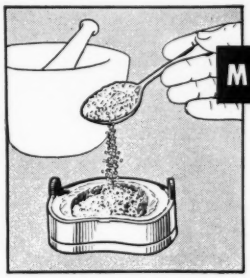
ACCURATE ADAPTATION ASSURED!

LUXENE

The BAKELITE Denture Material . . .

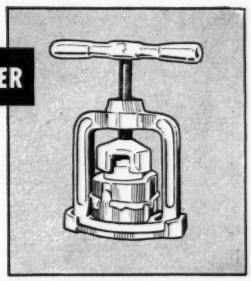
UNCURED RESIN . . NOT A PRE-CURED BLANK

No tendency to revert to a preformed shape



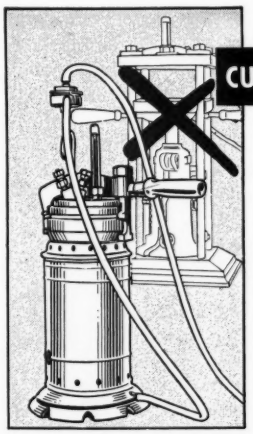
MELTS AND FLOWS INTO EVERY CREVICE

Forms enamel-like union with teeth and metal



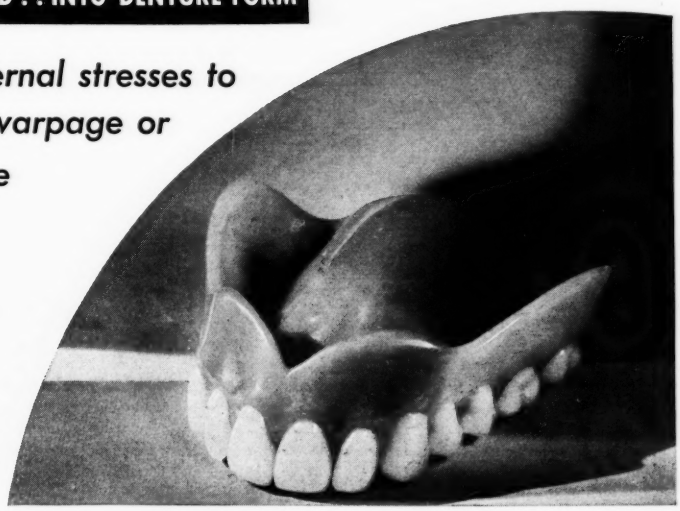
REQUIRES EVEN LESS PRESSURE THAN RUBBER

No danger of distorting the model or mold



CURED . . NOT PRESSED . . INTO DENTURE FORM

No internal stresses to cause warpage or fracture



Developed, Produced and Sponsored by
BAKELITE CORPORATION

Distributed by

THE RANSOM & RANDOLPH COMPANY • TOLEDO, OHIO

PROGRESS *with* SECURITY

• For many months before any structure appears, workmen toil on a skyscraper, founding it upon bedrock.

• So, too, with a new Ney alloy,—many months of painstaking tests precede the actual appearance of the new product on the market.

• Our customers are not our laboratory. We do not expect them to share our laboratory failures — only our successes.

• When you purchase a Ney alloy you may do so with complete confidence that it will positively fulfill all requirements of the technique for which it is indicated.

• It is founded upon the bedrock of tests far more complete and drastic than actual practice could possibly be.

THE J. M. NEY COMPANY
GOLD LICENSE NO. 224
Hartford, Conn. Chicago, Ill.

SCIENTIFICALLY CLEAN

TODAY new methods are employed in the manufacture of the most modern antiseptic. Thus is brought a great advance in sanitation. From its very beginning Pepsodent Antiseptic avoids contact with human hands to prevent contamination. Raw materials are mixed—bottles filled, capped, labeled and packaged—all by machine. The extra protection these methods give never fails to impress medical men who visit the Pepsodent Company's modern plant. Here laboratory care is increased a million fold.

NRA WE DO OUR PART

THE PEPSODENT CO., CHICAGO

IF you haven't renewed your subscription for 1934 . . . .

YOU'LL find a subscription postcard in this issue if we haven't received your renewal for 1934 either direct or through your dental dealer. Fill it out immediately and return it to us so that we may continue to send you THE DENTAL DIGEST without interruption.

If there is no card enclosed with your copy of this issue it is your assurance that your subscription has been renewed.

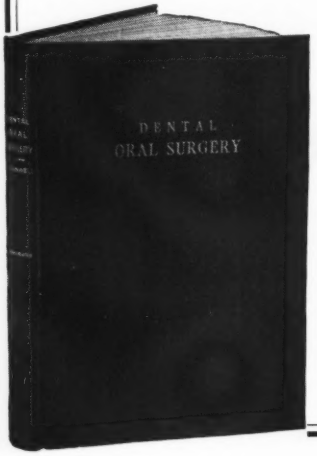
THE DENTAL DIGEST

"I am a general practitioner and I find Cogswell's DENTAL ORAL SURGERY invaluable to me in my practice. I know his technique for the removal of teeth is the best I have ever had the privilege of studying and this technique is presented step by step in a simple, understandable manner through the use of numerous illustrations.

"I have read DENTAL ORAL SURGERY thoroughly and I am being frank when I say that a copy of this book is a valuable addition to my dentist's library."

Order your copy today. Use the coupon on page 488. *It is for your own convenience.* Price $10.00

The Dental Digest
1005 Liberty Avenue, Pittsburgh, Pa.



"I Refer to

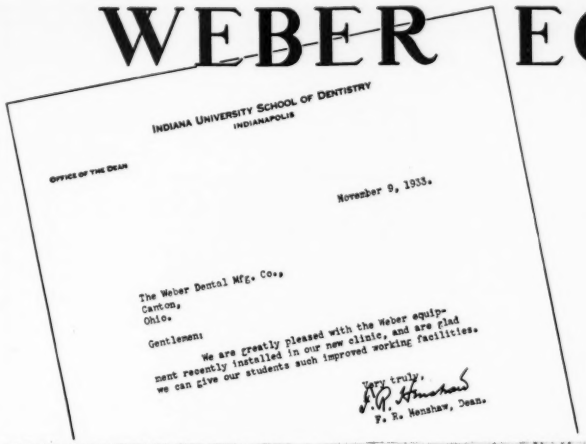
DENTAL ORAL SURGERY

very often in my practice"

WEBER EQUIPMENT

in New Clinic

INDIANA UNIVERSITY SCHOOL of DENTISTRY



INDIANA UNIVERSITY SCHOOL OF DENTISTRY
INDIANAPOLIS

OFFICE OF THE DEAN

November 9, 1933.

The Weber Dental Mfg. Co.,
Canton,
Ohio.

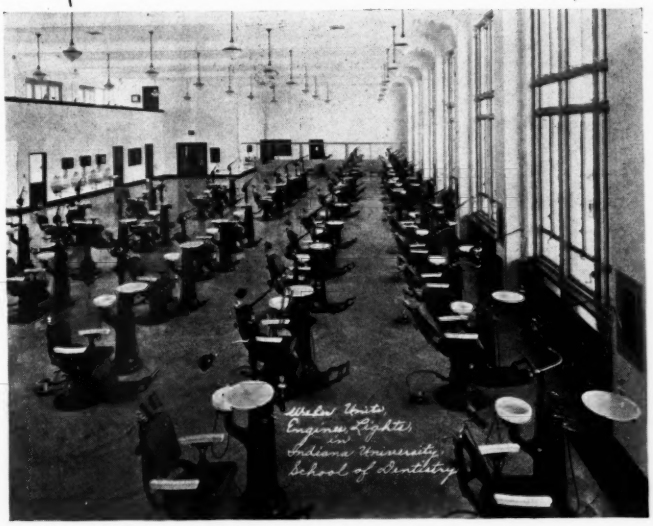
Gentlemen:

We are greatly pleased with the Weber equipment recently installed in our new clinic, and are glad we can give our students such improved working facilities.

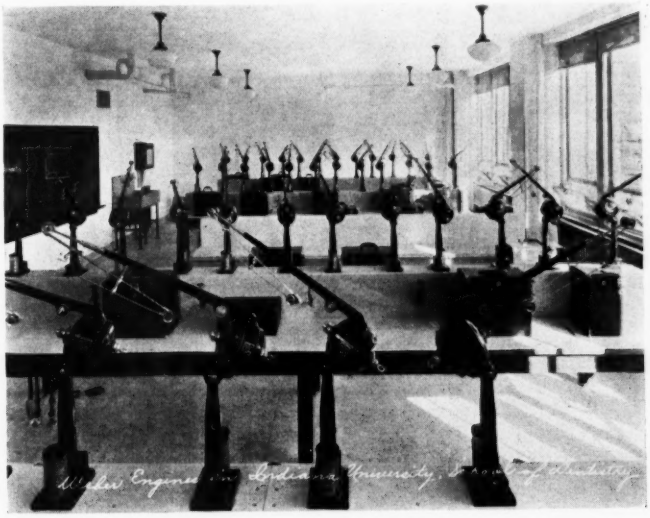
Very truly,
F. R. Henshaw, Dean.

"We are greatly pleased with the Weber equipment recently installed in our new clinic, and are glad we can give our students such improved working facilities."

F. R. Henshaw, Dean.



Completely equipped with Weber Nu-Dent Units, Engines and Lights.



Weber Engines in Laboratory

The trend of the times is to provide the latest improved working facilities for those learning dentistry. As we have had much experience in equipping colleges we can offer practical cooperation.

THERE is much responsibility attached to selecting dental equipment for a college, and the authorities naturally make a thorough investigation and give the subject most careful consideration. Therefore, we are particularly gratified that Weber equipment was chosen for this progressive institution.

A NEWLY EQUIPPED OFFICE WILL STIMULATE YOUR BUSINESS

WE have made good dental equipment for over thirty-six years, but our present line is the finest we ever offered and yet is priced exceptionally low. You should know about it, and we would be glad to send you free upon request a beautiful catalog illustrated in colors. Clip the coupon and mail. You will be pleased with our quality and prices.

— — — — — — — — — —

THE WEBER DENTAL MFG. CO. D. D. 12
CANTON, OHIO

Please send me a copy of the new Weber catalog.

Dr. _____

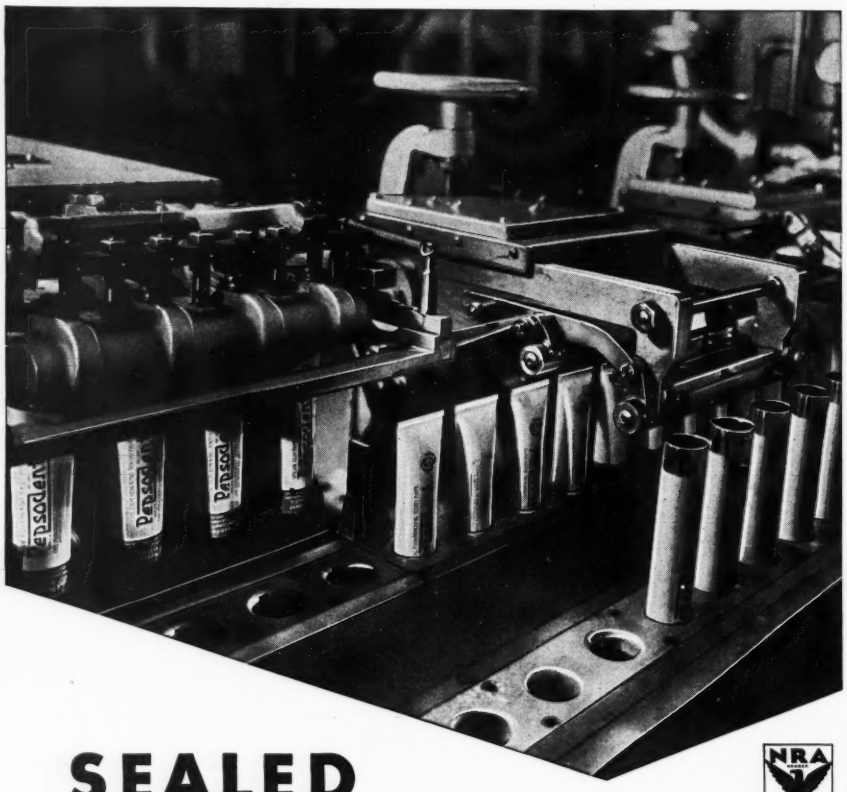
Address _____

City _____ State _____

Dealer _____

Should you prefer not to mutilate this page, there is a similar coupon on page 488.

Export Department, 149 Broadway, New York City.



SEALED WHILE IT'S MADE

PEPSODENT Tooth Paste does not come into sight for one second during its manufacture. It is made in machines sealed to the open air.

Every scientific man is interested to hear that Pepsodent's materials are not touched by human hands—that they are not exposed to the air as they pass through the many steps in manufacture.

Such is the scientific progress made in the manufacture of the film-removing tooth paste. Teeth are precious. Why risk them on any tooth paste but the finest—the purest—the safest?

THE PEPSODENT CO., CHICAGO

THE ARISTOCRAT *of Dental Restorations*

MOST artificial teeth are simply veneers which add natural appearance to a bridge, such as Steele's Facings. In Steele's Trupontics this veneer is so designed as to replace practically all advantages of natural teeth.

Strength, beauty, natural tissue contact and dependability are all features of Trupontics, truly the "Aristocrat of Fixed Bridge Restorations."

Steele's INTERCHANGEABLE *Tru*pontics

ONCE USED . . . . . .

. . . ALWAYS PREFERRED

THE COLUMBUS DENTAL MFG. CO. Columbus, Ohio-U.S.A.

COUPONS

See second cover D.D.12

SPYCO SMELTING & REFINING CO.
51 SOUTH THIRD ST., MINNEAPOLIS. MINN.
Please send me: Physical charts and other information on Tinker Golds. ☐
A copy of the Sypco Tempering Booklet ☐

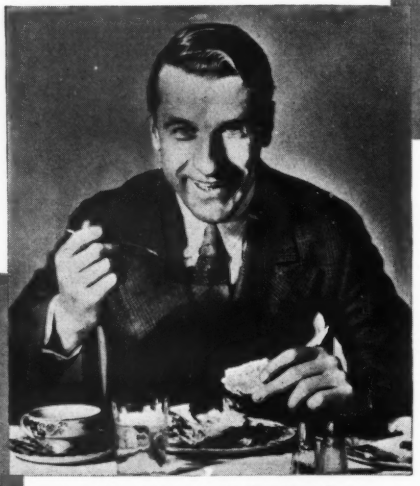
Dr. .....
Address .....
City .....

See page 480 D.D.12

THE PELTON & CRANE COMPANY
632 HARPER AVE., DETROIT, MICH.
Please send complete information concerning PELTON Equipoised Operating Light.

Dr. .....
Address .....
Dealer .....

WILSON'S
CO-RE-GA
(POWDERED)
THE PERFECT ADHESIVE FOR DENTURES



NRA MEMBER U.S. WE DO OUR PART

Prescribe Wilson's CO·RE·GA to complete a satisfactory denture service. It helps the patient when he most needs encouragement.

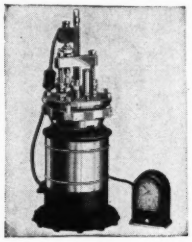
PLEASE SEND FREE SAMPLES FOR PATIENTS
Dr. .....
.....
.....
COREGA CHEMICAL CO.
208 ST. CLAIR AVE., N.W.
CLEVELAND, OHIO U.S.A.
This Coupon is for Dentists use Only

The Trial Size CO·RE·GA is Furnished to Dentists
Mail the Coupon for

DON'T GAMBLE!

A dental vulcanizer *can* wear out. Given time, every dental vulcanizer *will* wear out.

Don't Gamble with the life of your vulcanizing equipment. An old vulcanizer is dangerous, while a new one can be trusted. And new vulcanizers are capable of handling the thermo-cured resins, as well as rubber and celluloid.



The NEW Edson

NRA MEMBER U.S. WE DO OUR PART

Use the coupon on this page in sending for your copy of the new Buffalo Vulcanizer bulletin.

Buffalo Dental Mfg. Co.
Kehr & Urban Sts. Buffalo, N. Y.

See page 484 D.D.12

THE DENTAL DIGEST
1005 LIBERTY AVENUE, PITTSBURGH, PA.
Please send me a copy of "Dental Oral Surgery," at $10. Send C.O.D. ☐ Send through my dealer. ☐

Dr. .....
Address .....
Dealer .....

See page 485 D.D.12

THE WEBER DENTAL MFG. CO.
CANTON, OHIO.
Please send me a copy of your catalogue.

Dr. .....
Address .....
Dealer .....

See third cover D.D.12

LEE S. SMITH & SON MFG. CO.
7325 PENN AVENUE, PITTSBURGH, PA.
Please send me literature on VYDON.

Dr. .....
Address .....
City .....

See ad above D.D.12

BUFFALO DENTAL MFG. CO.
KEHR & URBAN STS., BUFFALO, N. Y.
Please send me a copy of your new bulletin as mentioned in ad.

Dr. .....
Address .....
Dealer .....

TWICE A YEAR

for

DENTURE PATIENTS

too

If natural teeth require daily care and the services of a dentist twice a year, surely the proper care of dentures necessitates no less attention.

Patients should be impressed with the fact that a denture is a finely wrought laboratory creation in which science has endeavored to reproduce the inimitable combination of delicacy and strength embodied in the human mouth. The need for careful treatment of such a product should be duly emphasized and the patient should not be lead to expect too much from even the most skillfully made denture.

It should be explained that the mouth, not the denture, changes constantly making periodic adjustments essential for denture comfort.

Make your patients appreciate that the finest denture material* like the finest motor car cannot give satisfaction if abused or neglected, or if they fail to have it examined regularly and serviced when necessary.

***VYDON**

The Denture Base

LEE S. SMITH & SON
MANUFACTURING CO.


TRANSLUCENCE
DARKAMOUNT INCREASES
OR PORCELAINE
MANY LAYERS MAKE A PEARL
ENAMEL OVER DENTINE GIVES
NATURAL TEETH TRANSLUCENCE
THE FILM OF ENAMEL OVERLAYING THE
BODY INCREASES TRANSLUCENCE IN
NEW TRUBYTE
THE DENTISTS' SUPPLY COMPANY OF NEW YORK